The United States Environmental Protection Agency:

Tribal LifeLine Project

The Compendium of Alaska Traditional and Subsistence Dietary Files

Developed and Compiled by

The LifeLine Group™

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Chaisson, A.M. and Chaisson, C.F.

As part of the EPA Tribal LifeLine Project

Elizabeth Resek, Project Officer

The Compendium of Alaska Traditional and Subsistence Dietary Files

Principle Investigator: Anne Marie Chaisson, MPH, RD, The LifeLineGroup™ [1]

Project Director: Christine Chaisson, PhD, The LifeLine Group™

Project Officer: Elizabeth Resek, MS

Deputy Director

Office of Science Coordination and Policy

Office of Prevention, Pesticides and Toxic Substances, EPA

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[1] The LifeLine Group, Inc. is a nonprofit [501(c)(3)] organization registered in the Commonwealth of Virginia, USA. The LifeLine Group, 4610 Quarter Charge Drive, Annandale, VA 22003

Acknowledgements:

This project was accomplished with funding from the US Environmental Protection Agency, Contract Number EP-W-05-016, a project dedicated to modifying the existing LifeLine™ exposure and risk assessment software to make it capable of considering the dietary practices, lifestyle patterns and traditional activities enjoyed by Native Americans in their unique communities. This Compendium is one product from that project and it represents a new way of utilizing the best available information about the harvesting, preparation and consumption of traditional foods by the peoples in the tribal communities of Alaska. Data in a variety of formats and related descriptive information were collected and reviewed by persons deemed to be expert by their academic credentials, experience with the subject matter and/or practical knowledge of the dietary patterns of the communities, food sources, food distribution, preparation and consumption. The Compendium represents a process wherein many dedicated people from different communities and cultures combined their efforts to create a database that may inform the process by which public health policy decisions are made at any level of government. Together with the tool for modifying the information[2], it initiates a capacity to better describe dietary profiles for these and any other unique population groups. The scientists at The LifeLine Group™ are pleased to have been able to work on this project and acknowledge the many individuals who have supported or aided the work.

With appreciation to all the Alaskan Tribal representatives and community leaders that assisted with this project compendium including, among others, Lydia Olympic, Karen Pletnikoff with the Aleutian and Pribilof Islands Association, Ethel Karmun an elder in Nome Alaska, and Yvonne Sarren, Joan Johansen, and Alvina Katchatag, community members Unalakleet, Alaska.

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[2] LifeLine Dietary Record Generator™ available to all interested parties without cost (also completed under EPA contract EP-W005-016)

Substances, EPA and Carol Jorgensen, Director, EPA American Indian Environmental Office.

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Further Information and Software Access:

The complete Compendium of Alaska Traditional and Subsistence Dietary Files can be found on the CD contained with this documentation. It can also be located on the web at www.TheLifeLineGroup.org. The LifeLine Dietary Record Generator™ Version 1.0 (completed under EPA contract EP-W-05-016) was used to create the dietary files contained in this compendium. That software, as with all LineLine™ software is copyrighted and made available to all interested persons without barrier or cost. Updated versions of the Dietary Record Generator™ and training files for that software will be made available on The LifeLine Group™'s webpage. Please visit the webpage for these updates.

Acronyms

ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
ATDP	Alaska Traditional Diet Project
BBAHC	Bristol Bay Area Health Corporation
CINE	Center for Indigenous Peoples' Nutrition and Environment
GOCADAN	Genetics of Coronary Artery Disease in Alaska Natives
CSFII	Continuing Survey of Food Intakes for Individuals
CSIS	Community Subsistence Information System
DRG	LifeLine Dietary Record Generator™
EPA	Environmental Protection Agency
FFQ	Food Frequency Questionnaire
IOM DRI	Institute of Medicine, Dietary Reference Intakes
LLG	The LifeLine Group™
NHANES	National Health and Nutrition Examination Study
NSHC	Norton Sound Health Corporation
SEARHC	SouthEast Alaska Regional Health Consortium
TCC	Tanana Chiefs Conference
USDA	United States Department of Agriculture
YKHC	Yukon-Kuskokwim Health Corporation

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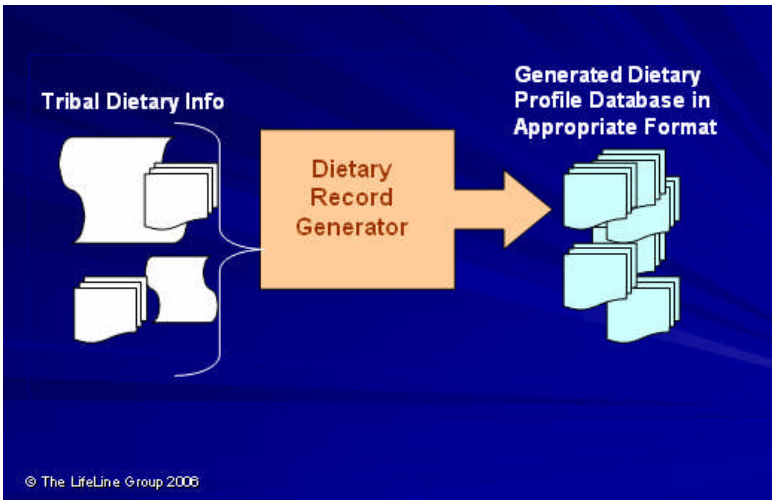
CHAPTER 1. INTRODUCTION AND APPROACH

The EPA Tribal LifeLine™ Project arose out of concern that unique dietary practices, lifestyle patterns and traditional activities enjoyed by Alaska Native populations were not considered in the current risk assessment paradigm. At present surveys describing the general US population are used as the basis for risk assessment models. While useful as a means to describe exposure in the general US population, many subpopulations with unique exposure opportunities are not represented by these surveys and consequently are not accounted for in the models. While the EPA Tribal LifeLine™ Project began with the aim to address unique exposure opportunities of Alaska Native populations, the lessons learned and tools developed in this project are applicable to any Native American or other unique population.

The Dietary Record Generator™ (DRG) is a tool for addressing the dietary profiles seen in the Alaska Native or any other population. It is a building block within the much larger Tribal LifeLine™ Project and the first application in a suite of forthcoming software models. This suite of models is being built to assess exposure from multiple routes while allowing the user to more closely describe dietary practices and activity patterns that affect exposure in the population of interest.

The DRG allows the user to build dietary files which can be used in the LifeLine™ or any other risk assessment model. It incorporates information about dietary patterns from a wide array of sources and converts it to one database in a format useable by architects of dietary exposure/risk assessment models. The DRG allows the opportunity for dietary consumption parameters to be based upon the best available evidence from multiple data sources. Until now, only comprehensive data sources such as Continuing Survey of Food Intakes for Individuals (CSFII) or National Health and National Examination Study (NHANES) have been used. The figure below shows pictorially how the DRG functions.



The Compendium of Alaska Traditional and Subsistence Dietary Files, to which this document pertains, was created using the DRG and describes more closely than standard US surveys the diet enjoyed by Alaska Native populations. The goal of building these files is to consider traditional or subsistence diets when making decisions that affect the health of the tribal communities and their environment.

1.1 Approach and Principles

The powerful ability to more closely define the diets of unique populations and have them considered in state-of-the-art risk assessment models raises the need for principles to be followed by the user of the model. While each user may define this differently, the LifeLine Group™ has used several principles in building the Compendium of Alaska Traditional and Subsistence Dietary Files. The following principles were followed by the LifeLine Group™ and are suggested to other users of the DRG.

- The first principle governing the use of the DRG is that best available information should be used when creating a dietary file. It is suggested that the user outline what standards are selected for determining best available evidence. Statistically strong, current, and relevant measurements should be favored over measurements not possessing these qualities. This compelling opportunity to use the "best"

measurements can be used to select data of the highest quality and it is expected that files may contain data from more than one source.

- Since the DRG can use multiple sources of data, it has the opportunity to use the best available evidence regarding the consumption of foods. This opportunity requires that there be a strategy to preserve data quality. The LifeLine Group™ used four principles to preserve data quality. Each piece of information used was examined to be sure it met the following standards.

    - **Relevant:** The data source must provide information about parameters which are important to the DRG. This may include things such as what foods are eaten and in what form, probability of eating associated with different age groups, seasons, locations, amount eaten (portion size) and/or patterns (long term variability) associated with consumption of the food.

    - **Representative:** The data must provide information about the population under consideration. If the data does not directly describe the population under consideration, a rationale for extrapolation should be documented.

    - **Quantifiable:** Ideally, the data will carry with it a quantitative component. This may consist of an actual measure of amount eaten or harvested, a total weight eaten, a per capita weight consumed, percentages of people eating or using a resource or percent of resource used in a specific preparation method. In some cases this quantitative component is inferred.

    - **Transparent:** All data should be referenced to their source. The DRG provides ample opportunity for extensive referencing. Transparency is especially important when using non-customary sources of data such as narratives, personal experience, assumptions based upon similar foods or manipulation of existing data from studies. This information may not have been exposed to routes of validation familiar to "western standards" and may be more subject to debate than data provided from more customary sources such as large surveys.

- The LifeLine Group™ adhered to a policy of review by experts in the area of Alaska Native dietary practices. This review process was done simultaneously with the creation of the dietary files so that experts could review the development of each piece of the file on an ongoing basis. Determination of the population of interest, the relevant food list, and consumption parameters were intensively reviewed by credible experts. It is hoped that this review will lead to an accurate representation by each file of the regional diet it was intended to simulate as well as expedite acceptance of the files among risk assessors and members of the Alaska Native Population.

- Users of the DRG will be required to define the population of interest when creating a dietary file. Depending on the situation, this may be straightforward. Creating files in Alaska forced the question of whether one dietary file could capture the variation seen in the diet outside of age and season. In this case it was determined that the population needed to be more narrowly defined. Separate files were created for various regions. Considerations observed by The LifeLine Group™ when determining how to define the Alaska Native population were

    - Available data quality
    - Feasibility
    - Defensibility of the decision to define the boundaries/population

  Extensive documentation regarding the application of these principles in relation to the Compendium of Alaska Traditional and Subsistence Dietary Files is available in the corresponding chapter.

- Users of the DRG are also required to define a relevant food list for the population under consideration. The LifeLine Group™ used three principles for determining relevant foods to include on the food list and it is felt that foods meeting the following standards should be included in the food list.

    - Foods eaten in large amounts.

- Foods eaten by a large number of people.
- Foods known to carry high concentrations of toxins.

Extensive documentation and references regarding the food list used in the Compendium of Alaska Traditional and Subsistence Dietary Files can be found in the corresponding chapter.

CHAPTER 2. ECOLOGICAL-CULTURAL ZONES

The LifeLine Group™ recommended to the Environmental Protection Agency (EPA) to use Ecological-Cultural Zones as defined by the Alaska Department of Fish and Game (ADFG) in the construction of Compendium of Alaska Traditional and Subsistence Dietary Files using the Dietary Record Generator™ (DRG) software. The reasons for use of these Ecological-Cultural Zones, supporting documentation, as well as concerns over the use of these zones will be discussed. EPA accepted the recommendation from The LifeLine Group™ for the purpose of creating this Compendium.

2.1 The Five Ecological-Cultural Zones

There are five Ecological-Cultural Zones, including the Arctic-Subarctic Coast/Yupik-Inupiaq, Aleutian Pacific/Aleut-Alutiiq, Subarctic Interior/Athabaskan, Southeast Alaska Coast/Tlingit-Haida and Urban-Urban Periphery (Alaska Department of Fish and Game, 2000).

The LifeLineGroup™ adopts the division of the state of Alaska by Ecological-Cultural Zones for several reasons.

- There is evidence through rigorous statistical analysis that the Ecological-Cultural Zones best reflect the differences in harvest practices (used as proxy for consumption) between zones (Ponce, Bartell, Haness, Nobmann, 1997). The Ecological-Cultural Zones were compared to the ADFG Subsistence Regions and the Federal Subsistence Regions, alternate methods for dividing Alaska for purposes of regulation and monitoring, and were shown to provide the "highest degree of discrimination in harvest practices among regions in Alaska, supporting its use as the default regional definition for use by the Alaska Department of Environmental Conservation when examining subsistence issues" (Ponce, Bartell, Haness, Nobmann, 1997, p10). In addition, this analysis was done with the express purpose of calculating dietary intake rates for major subsistence food groups. Therefore, it is applicable specifically to dietary information.

- These zones "may reflect coastal, interior and urban harvest patterns better than other systems [and] ecological regions may be more justifiable from a scientific perspective than are administrative jurisdictions" (Ponce, Bartell, Haness, Nobmann, 1997, p 41).

- These regions were originally proposed by ADFG to "reflect the predominant Native culture associated with different geographic areas of the state." (Alaska Department of Fish and Game, 2000, p 64). Both harvest estimates (as an indicator of intake rates) as well as cultural differences are significant factors in dietary variation among regions.

- The ADFG as well as the Alaska Department of Environmental Conservation (ADEC) have both used these zones as a basis for their data analysis in relation to subsistence intake rates as well as dietary exposure analysis (Alaska Department of Fish and Game, 2000 and Ponce, Bartell, Haness, Nobmann, 1997). Upon completion of the Tribal LifeLine™ Model, consistency in regional definitions will allow for comparison between previously published information and information generated by the model.

- The division of the state into five regions is a feasible number of regions to work with in the modeling process.

Using the Ecological-Cultural Zones has many strengths when applied to this specific purpose, however; it is acknowledged that this approach is not without limitation.

Of primary importance, it is noted that ADEC no longer uses the Ecological-Cultural Zones as a basis for their community-based risk assessment. As of 2003, ADEC has adopted a community-specific approach to risk assessment. In reference to the 1997 ADEC publication it is noted that, "Comments received from the public emphasized that the results from this approach were too general to make exposure assumptions that could be used to assess risk at a site. It was noted that traditional foods consumed in Alaska

vary considerably by geographic region, local preference and season. The results of this trial showed that estimates on how much wild food people in a village are eating must be made on a local basis" (Alaska Department of Environmental Conservation, 2003). While this concern is noted, it is not feasible to build a dietary file that would account for variations in each individual community throughout Alaska. Moreover, the LifeLine Dietary Record Generator™ software will allow for community-specific information to be entered by the user of the program, allowing the user the flexibility to incorporate more specific information into the program when that information is available.

It is acknowledged that any "boundary" drawn is to some degree artificial. While this poses difficulty, it is a necessary part of this project. No division of the State would be without this complication. While some zones such as the Arctic-Subarctic Coast/Yupik-Inupiaq region appear very large and perhaps too expansive, this division of Alaska was shown to be the "most accurate" reflection of differences between subsistence areas in the state (Ponce, Bartell, Haness, Nobmann, 1997).

The LifeLineGroup™ recognizes that there have been many divisions of the state of Alaska by different agencies for various reasons. Several of these options have been considered along with the advice of nutrition, public health and wildlife experts who have specific knowledge regarding Alaska's unique situation. It has not been shown that there is a better way of dividing the state which would improve The LifeLineGroup™'s ability to accurately reflect dietary patterns throughout the state of Alaska. The LifeLine Group™ has adopted these Ecological-Cultural Zones as the standard by which dietary files will be created.

For further information, a map of these zones is included in Appendix A, a description of the zones can be found in Appendix B, and a complete listing of community names categorized by Ecological-Cultural Zone is available in Appendix C.

2.2 References

Alaska Department of Fish and Game, Division of Subsistence, United States Government. (2000). *Community Profile Database Technical Documentation.* Anchorage, AK. Retrieved July 7, 2006 from http://www.subsistence.adfg.state.ak.us/download/tecdoc00.pdf

Ponce, R., Bartell, S., Haness, S., & Nobmann, E. (1997). *Establishing Alaska Subsistence Exposure Scenarios*. Prepared for the Alaska Department of Environmental Conservation. IDM Consulting.

Alaska Department of Environmental Conservation, United States Government. (2003). *Evaluating Risk to Subsistence Food Users, Abstract for ASTSWMO Poster Session*. Anchorage, AK.

CHAPTER 3. FOOD LIST DOCUMENTATION

3.1 Food List Construction

A universal food list to be used in each of the Ecological-Cultural Zones was developed relevant to the unique dietary profiles seen in Alaska. Three principles guided the development of this food list to be used in the dietary files with the Dietary Record Generator™ (DRG). Every effort was made to include foods eaten by a large number of people in the population or foods eaten frequently, foods eaten in large amounts (even if they aren't eaten by many people or frequently), and foods known to carry high levels of substances of interest regardless of the frequency or amount eaten (chemicals, toxins, etc.). While it is felt that the food list includes all relevant foods, it is acknowledged that every possible food was not included on the food list.

The process by which the food list was developed was first to identify data sources that were available regarding foods eaten in Alaska, and then to use expert advice and opinion to determine a relevant food list. Two main data sources contributed to the effort to define foods that were included in the food list; the Community Subsistence Information System (CSIS) and the Alaska Traditional Diet Project (ATDP). These two main data sources were supplemented by information from the Subsistence Technical Paper Series published by the Alaska Department of Fish and Game (ADFG), other published materials, personal experience and anecdotal evidence.

The ADFG, CSIS (See Appendix D) provided a list of resources harvested from the Alaskan land. Each of these harvested resources was considered as a possible food source, although resources could also be listed by CSIS because they are used for native crafts, clothing or other traditional uses. Some resources which were reported as harvested by the CSIS were not included in the food list as they are known to be used predominantly for uses other than food (for example fox, which is not used for food but for its pelt). This list is limited in that it describes harvest and not consumption directly.

Similar to the way that shelf disappearance data is used, it is assumed that harvest can be used as a proxy estimate for consumption. This food list is not specific to the preparation method or parts of an animal/resource eaten. For example, it describes harvest of caribou, but provides no insight on how much caribou is eaten cooked or dry. Despite these limitations, the harvest estimates provide a wonderful opportunity for harvest (and by proxy consumption) comparisons between Ecological Cultural Zones.

The Alaska Traditional Diet Project (ATDP) is the other resource which provided insight into foods that were included in the food list. This resource contains results from a food frequency questionnaire (FFQ) administered in Alaska. The FFQ was developed by two prominent Alaskan nutritionists and was comprehensive in their opinion. Respondents also had the opportunity to write in additional foods which were not listed on the FFQ survey. The FFQ was examined for its list of foods and these foods were adopted into the food list when there was associated consumption information reported. Not all foods from the FFQ were incorporated into the food list, as not all foods had associated consumption information.

The FFQ has the benefit that its objective is to "quantify the intake of subsistence foods among residents of villages in rural Alaska." It does describe foods by preparation method and part and measures consumption of subsistence foods directly.

Expert opinion was also employed. Included in this documentation is a list of commonly consumed foods compiled by Alaska expert nutritionist Betsy Nobmann PhD, RD. (available in Appendix E). A potential food list was assembled and reviewed by Alaska nutritionists. It was felt that in their expert opinion, this food list was comprehensive and adequate to meet the goal that foods eaten by a large number of people in the population or foods eaten frequently, foods eaten in large amounts and foods known to carry high levels of substances of interest were represented by this food list.

The same food list was adopted for use in each Ecological-Cultural Zone. While many foods are eaten in only specific locations, the universal nature of the food list was

preserved. Foods for which no harvest or consumption was recorded have a zero probability of eating associated with them. The LifeLine Group™ wanted to keep a universal food list as it is known that as travel becomes more frequent and people move around more often, the exchange of foods and use of foods from non-local places becomes more prevalent.

Food lists can be constucted in a telescoping manner similarly to the way the food list is set up for the CSFII. However, this food list contains only minimal telescoping as the way in which harvest and consumption data were reported and the resulting data manipulation dictated that each food must be described with a probability independent of the next.

It should be noted that this food list is limited in that it includes only foods for which consumption or harvest data is available. This is a practical limitation dictated by the available information. If evidence surfaces that this list is lacking in any food for which data is available, the flexibility of the DRG allows the user to add in additional foods.

3.2 References

Ballew, C., Ross, A., Wells, R., Hiratsuka, V., et al. (2004). *Final Report on the Alaska Traditional Diet Survey*, Alaska Native Epidemiology Center, Alaska Native Health Board. Retrieved from http://24.237.7.166/epicenter/pdf/traditional_diet.pdf.

Alaska Department of Fish and Game. (2006). *Community Subsistence Information System*. Harvest per user calculated by special request for The Tribal Lifeline™ Project. Anchorage, AK.

Alaska Department of Fish and Game, Division of Subsistence, United States Government. (2000). *Subsistence Technical Paper Series*. Anchorage, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/

3.3 Calorie References for Foods

Every attempt was made to have a measured calorie reference for each food in the food list. Two sources were used as references for calorie levels of food. The Alaska

Traditional Knowledge and Native Foods Database and the United States Department of Agriculture's (USDA), Food Search for Windows Version 1.0, both provided calorie estimates for foods included in the food list. When available, the calorie levels of subsistence foods were identified in the Native Foods database. If the estimate was not available there, the food was searched for in the USDA database. If neither of these resources contained an estimate for the calorie level of the food, a proxy estimate for a comparable food was used. The documentation describing the source of the data for calorie density of foods is available in the references contained within the Compendium files.

3.4 References

Alaska Native Science Commission, Alaska *Traditional Knowledge and Native Foods Database*. Retrieved from http://www.nativeknowledge.org

United States Department of Agriculture, *Food Search for Windows Version 1.0*, Database Version SR18. Retrieved from http://www.nal.usda.gov/fnic/foodcomp

CHAPTER 4. ACCEPTABLE CALORIE RANGES

The Dietary Record Generator™ (DRG) requires that an acceptable calorie range for each age range and season be entered in order to remove from the final dietary file unreasonable daily files which are created due to random variation inherent in this probabilistic application. The goal for setting up this calorie range is that it be narrow enough to eliminate unreasonable files and wide enough to allow for random variation seen in dietary intake. Variation due to differences in caloric intake between individuals as well as differences in caloric intake within the same individual due to day to day variability both need to be considered in this range of acceptable calorie intake.

Studies are available which detail the number of calories consumed by the Alaska Native population. The Genetics of Coronary Artery Disease in Alaska Natives (GOCADAN) Study has been chosen as the most recent and applicable study containing information regarding the calories consumed by adults. This study reports calorie intakes for adults in the Norton Sound Health Corporation. The other studies available are either older or look at dietary intake during only one season. The data regarding calorie intake was taken from the GOCADAN Study. The data regarding calorie intake in all of the available studies are consistent with the estimate used from the GOCADAN Study. All of the studies available are limited in that they investigate calorie intake in a small region (the Northwest Arctic). These calorie ranges will be applied to all Ecological-Cultural Zones, with the understanding that this extrapolation may not be entirely accurate. This is an area where more research is needed to describe calorie intake in diverse regions of Alaska.

Study results reported were the 25th percentile, median and 75th percentile of calorie intake for three age ranges; 17-39year old, 40-60year old, and 61-92year old men. These same parameters are available for women but were not used in the construction of this Compendium. In order to create a range of possible intakes from these reports, the median and 75th percentile were entered into Crystal Ball™ software for a normal distribution and the 10th percentile and 90th percentile were used as the upper and lower

bounds of the calorie range (See Appendix F). It is suggested that this Compendium be modified in the future to include calorie levels relevant to women's dietary intake.

No information is available regarding the calorie requirements or intake of children in Alaska. Until better information becomes available, it is necessary to use what is known about children's intake with an understanding that this extrapolation is limited. The estimated energy needs of children from the Institute of Medicine are available and were used to calculate a percentage of energy needs from an adult reference group. Adults age 19-30 were used as the reference group, and children's energy needs are expressed as a percentage of the adult energy needs (See Appendix G). These factors are applied to the upper and lower calorie estimates for adults. This "scales back" the adult energy intake to reflect a child's energy needs.

4.1 The Calculation of the Calorie Reference for Each Age Range

The calculation of the calorie reference for each age range is detailed below.

- For the age range 20-60 years in the DRG file, the range of calorie intakes computed for males age 40-60 years was used in place of the range for males 17-39 years. The two ranges were comparable, but the range calculated for males 40-60 years was larger and was used in the interest of being more inclusive. The computed range for males 40-60 years did contain an unreasonably low estimate at the 10th percentile (16 calories per day is the estimate at the 10^{th} percentile), so the 20th percentile was used as the lower bound. This 20^{th} percentile estimate was also consistent with the 10^{th} percentile estimate for males age 17-39 years of age.

- For the age range 60+ years in the DRG file, the range of calorie intakes computed for males age 60-92 years was used. The 10^{th} percentile was the lower bound and the 90^{th} percentile was the upper bound.

- For the age range males 13-19 years in the DRG file, the range of calorie intakes for males age 20-60 years was adjusted by a factor of 0.92, per the scale computed from the Institute of Medicine, Dietary Reference Intakes.

- For the age range 6-12 years in the DRG file, the range of calorie intakes for males age 20-60 years was adjusted by a factor of 0.69, per the scale computed from the Institute of Medicine, Dietary Reference Intakes.

- For the age range 3-5 years in the DRG file, the range of calorie intakes for males age 20-60 years was adjusted by a factor of 0.54, per the scale computed from the Institute of Medicine, Dietary Reference Intakes.

- For the age range 1-2 years in the DRG file, the range of calorie intakes for males age 20-60 years was adjusted by a factor of 0.38, per the scale computed from the Institute of Medicine, Dietary Reference Intakes.

- For the age range 0-1 years in the DRG file, the range of calorie intakes was not determined. Due to a lack of information regarding intake parameters, this age range is left out of the assessment. More data is needed to describe intake during this very important life stage.

These calorie ranges are consistent with what is known about energy needs of humans in different life stages. It is important to realize the limitations of these calculations in that the Institute of Medicine Dietary Reference Intakes are computed for persons living in the continental United States and do not take into account differing genetic characteristics, lifestyle or activity patterns in Alaska which may affect calorie needs. Until better information is available regarding children's intake, this scale will be used.

4.2 References

Nobmann, E., Byers, T., Lanier, A., Hankin, J., & Jackson, M. *The Diet of Alaska Native Adults: 1987-1988*. American Journal of Clinical Nutrition, 1992, 55:1024-32.

Risica, P., Nobmann, E., Caulfield, L., Schraer, C., Ebbesson, S. *Springtime Macronutrient Intake of Alaska Natives of the Bering Straights Region. The AK Siberia Project*. International Journal of Circumpolar Health, 2005, 64:3.

Nobmann, E., Ponce, R., Mattil, C., Devereux, R., Dyke, B., Ebbesson, S., Laston, S., MacCluer, J., Robbins, D., Romenesko, T., Ruotolo, G., Wenger, C. & Howard, B. *Dietary Intakes Vary with Age Among Eskimo Adults in Northwest Alaska in GOCADAN Study 2000-2003*. Journal of Nutrition. 2005; 135(4):856-62 .

A Report of the Panel on Macronutrients, Subcommittees on Upper Reference Levels of Nutrients and Interpretation and Uses of Dietary Reference Intakes, and the Standing Committee on the Scientific Evaluation of Dietary Reference Intakes. (2005). *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids (Macronutrients*). The National Academies Press.

CHAPTER 5. CONSUMPTION PARAMETERS

The portion size and probability of eating are the two main consumption parameters that will be discussed.

5.1 Portion Size

Portion size is the estimate of how much food is eaten when it is eaten. Unfortunately, there are no studies or resources describing portion sizes of foods eaten by Alaska Native communities. Portion size data are therefore resultant from the assessments done by the Centre for Indigenous Peoples' Nutrition and Environment (CINE) about Yukon First Nations, Inuit and Dene/Metis dietary practices in Canada. The Yukon First Nations Study reports a mean portion size, standard deviation and number of respondents. In this case, these numbers are used to inform a distribution. Inuit and Dene/Metis studies only report a mean portion size and the number of respondents. When only means (point estimates) are available, they will be used in place of a distribution. When no information regarding portion size is available, a proxy number will be used and referenced to its source. An effort has been made with the assistance of experts to have proxy portion size estimates come from foods of a similar type which are used in a similar fashion. Often several sources report a portion size for one food. When this is the case, the best effort is made to select the estimate with the highest number of respondents.

The fact that all portion sizes are proxy estimates from data collected in Canada, reveals a big information gap regarding what is known about dietary practices in Alaska. It is recommended that this be an area where further research takes place. It is recommended that this portion size information be collected specific to season and to Ecological-Cultural Zone. The limitation of the data at present requires the assumption that portion sizes are the same in every Ecological-Cultural Zone and in every season.

An average portion size is assigned to each food for the purposes of determining the number of eating events and therefore probability of eating. The average portion size for fish, dry fish, meat and dry meat was given in Receveur's text (1998, pg 19) and an average of the estimates for men and women was used. For foods which do not belong to these categories, a weighted average is calculated and assigned as the average portion size.

In order to deal with the lack of information available regarding portion sizes for children, the same scale developed for use in the calorie range and based upon the Institute of Medicine, Dietary Reference Intakes was applied to portion sizes. The factor calculated for each age group is applied to the mean and standard deviation to calculate portion size distributions or is applied to point estimates. The scale can be found in Appendix G. Using this scale has the same benefits and limitations as described in the chapter on acceptable calorie ranges.

Portion size information related to each specific food in each Ecological-Cultural Zone can be located in the food specific spreadsheets under the first heading. Anything differing from what is described here is described on the summary report (Appendix H) for each of the food groups.

5.2 References

Receveur, O., Kassi, H., Chan, P., Berti, H., & Kuhnlein, H. (1998). *Yukon First Nations' Assessment of Dietary Benefit/Risk*. Centre for Indigenous Peoples' Nutrition and Environment, Macdonald Campus of McGill University.

Receveur, O., Boulay, M., Mills, C., Carpenter, W., & Kuhnlein, H. (1996). *Variance in Food Use in Dene/Metis Communities*. Centre for Indigenous Peoples' Nutrition and Environment, Macdonald Campus of McGill University.

Kuhnlein, H., Receveur, O., Chan, H., & Loring, E. (2000). *Assessment of Dietary Benefit/Risk in Inuit Communities*. Centre for Indigenous Peoples' Nutrition and Environment, Macdonald Campus of McGill University.

5.3 Probability of Eating

Probability of eating refers to the estimate of how frequently a food is eaten. On a given day in a specific season and age group, the probability of eating refers to the likelihood that a food will be eaten. These estimates are calculated from both harvest estimates and consumption estimates respectively from the Community Subsistence Information System (CSIS) and the Alaska Traditional Diet Project (ATDP).

Probability of eating information and calculations related to each specific food in each Ecological-Cultural Zone and season can be located in the food specific spreadsheets under the second heading. Anything differing from what is described here is described on the summary report for each of the food groups.

5.3.1 CONSIDERATIONS FOR ESTIMATES FROM THE COMMUNITY SUBSISTENCE INFORMATION SYSTEM

Each Ecological-Cultural Zone shows the average total pounds harvested per user of the resource in the region as calculated by the Alaska Department of Fish and Game, Community Subsistence Information System (CSIS). The Alaska Department of Fish and Game calculated "user" numbers upon special request for the LifeLine Group™ for all foods in the CSIS. The CSIS database can be found in Appendix D and the communities listed by their Ecological-Cultural Zone can be found in Appendix C. The complete database was divided by community into Ecological-Cultural Zones and then average harvests were calculated for each resource.

These estimates are reported as pounds per user per year. The "user" is defined as a person within a family unit reporting that they used the resource. The family does not have to have hunted the resource to report that they use it. This is important because it is well documented that in some cases the number of people hunting/fishing a resource is much smaller than those who use it. The distribution network of traditional foods is extensive in most locations.

"Users" of resources are not necessarily only Alaska Natives, but rather are residents of Alaska who harvest under subsistence regulations. In rural communities, a larger percentage of the population is likely to be Alaska Native than in urban centers. In most rural regions, the harvest data may be fairly representative of intake in Alaska Native populations, as the number of non-native residents using traditional resources will be small. However, in urban centers, the mix of Native and non-native people is much more significant and therefore the harvest number will represent this mix of users. Alaska Native and non-native "users" are likely to use resources differently from one another. Urban and rural Alaska Native users may also use resources differently. Therefore these numbers should be considered estimates and care should be taken when interpreting the numbers, especially in the case of the Urban/Urban Periphery Zone.

The CSIS reports the harvest as dressed weight which is equivalent to the weight of a meat/fish when it comes from the grocery store. This harvest per user number has been adjusted for cooking losses by applying a factor of 0.75 to the original raw estimate from the CSIS. There is no information regarding weight loss from cooking/drying most resources. The factor of 0.75 for cooking/drying loss is an estimated factor and should likely reflect a greater reduction in weight. This issue is complicated by the fact that fat content of the resource, cooking method, drying time, drying conditions, etc will all influence how much weight is lost in the process. The only reference held at present is a "yield table" from the National Cattleman's Beef Council which describes cooking losses in beef. This reference reveals cooking yield of 28-75% depending on the type/cut of meat. In the interest of conservative estimates, the 75% yield will be used until better information can be attained. In the case of raw/frozen resources a cooking loss is not applied or is "undone" by applying a factor of 1.25 to harvest numbers.

The CSIS reports the type of resource without any further detail as to what preparation method or parts are being eaten. In order to deal with this and gain an estimate for the probability of eating for each preparation method or part, a set of percentages were developed based upon resources with known use from the ATDP and applied to foods

known to be used in similar ways. In cases where evidence shows that a food is not eaten in a similar way, the percentages are modified to reflect this.

The Urban/Urban Periphery Zone has its probability of eating derived entirely from estimates from the CSIS. As described previously, the percentage of each type of a food coming from one resource is calculated from the ATDP estimates and is applied to the CSIS harvest number. This allows the calculation of the number of pounds per user per year dedicated to each specific food preparation method or part. While it is likely that in rural areas more of the resource is preserved through drying and "other" parts are eaten more frequently than in urban areas, there are no data to inform exactly how much these uses may differ. It is assumed to be the same until further information is available.

5.3.2 CONSIDERATIONS FOR ESTIMATES FROM THE ALASKA TRADITIONAL DIET PROJECT

The average total pounds per user as calculated from the Alaska Traditional Diet Project (ATDP) are shown under the second heading in the food-specific spreadsheets.

The biggest limitation to using the data from the ATDP is that the regions defined by the ATDP study do not fit neatly into the Ecological-Cultural Zones used by the LifeLine Group™ to create the Compendium of dietary files. Upon advice of Alaskan experts, the regions reported by the ATDP have been combined to get estimates for annual per-user consumption for each Ecological-Cultural Zone as follows.

- Arctic-Subarctic Coast/Yupik-Inupiaq – Estimates from the Yukon-Kuskokwim Health Corporation (YKHC), Bristol Bay Area Health Corporation (BBAHC), and Norton Sound Health Corporation (NSHC) are averaged to get a consumption estimate.

- Aleutian Pacific/Aleut-Alutiiq – Estimates from the BBAHC, and the SouthEast Alaska Regional Health Consortium (SEARHC) are averaged to get a consumption estimate.

- Subarctic Interior/Athabaskan – Estimates from the Tanana Chiefs Conference (TCC) and the YKHC are averaged to get a consumption estimate.

- Southeast Alaska Coast/Tlingit-Haida – Estimates from the SEARHC are used as the consumption estimate

- Urban-Urban Periphery – No estimates from the ATDP are applicable to this Ecological-Cultural Zone. The ATDP did not perform surveys in any urban areas. In place of consumption estimates offered by the ATDP, the Compendium used harvest estimates from the ADFG CSIS survey.

The ATDP estimates are calculated as above and are reported in the food-specific spreadsheets. The "sum" number reported at the top of each region includes all preparation methods and parts of the resource that were reported by the ATDP. Depending on the resource, this may include dry, cooked or raw/frozen forms as well as any other organ or part eaten. This was done so that an easy comparison could be made between the total being reported by the ATDP and CSIS. The cells labeled ATDP mean, median or max (depending on the resource) will contain the estimate for the specific preparation method or part being consumed.

As in the CSIS, sometimes the ATDP reports just the type of resource without any further detail as to what preparation method or parts are being eaten. In order to deal with this and gain an estimate for the probability of eating for each preparation method or part, percentages of various preparation methods or parts are calculated based on such percentages for comparable resources with known, similar uses.. Again, in cases where evidence shows that a food is not eaten in a similar way, the percentages are modified to reflect this.

In some cases, dividing the resource up in this manner resulted in the estimates becoming too small and therefore insignificant. It was obvious that at times dividing the estimates to this degree of detail left almost all probabilities of eating at zero for all Ecological-

Cultural Zones. In these cases, categories such as "other" are reported and the user of the Compendium file must decide how to interpret this information. These data gaps likely indicate foods for which further information should be obtained.

5.4 References

Ballew, C., Ross, A., Wells, R., Hiratsuka, V., et al. (2004) *Final Report on the Alaska Traditional Diet Survey*, Alaska Native Epidemiology Center, Alaska Native Health Board. Retrieved from http://24.237.7.166/epicenter/pdf/traditional_diet.pdf

Alaska Department of Fish and Game, *Community Subsistence Information System*. (2006). Harvest per user calculated by special request for The Tribal Lifeline™ Project. Anchorage, AK.

Cattlemen's Beef Board and National Cattlemen's Beef Association. (2006. *How Much to Buy*. Retrieved from http://www.beefitswhatsfordinner.com/aboutbeef/pdf/HowMuchToBuyTable.pdf

5.5 Description of Calculations

A description of the calculations to estimate probability of eating follows.

- The calculation begins with the total pounds consumed per person per year of the specific resource reported by ATDP and/or CSIS.

- The total pounds per user per year is converted into the number of eating events per year (pounds of resource X 454 g / average portion size (g)). The average serving size is either given by the Center for Indigenous Peoples' Nutrition and Environment (CINE) report or when that is not available, calculated as a weighted average of serving sizes reported (see Section 5.1)

- The calculated number of eating events is subdivided into seasons based upon what is known about harvest patterns and/or seasonality of eating the resource.

- The process is repeated for each resource (the mean and maximum when available) in each season.

- When available, the mean and/or maximum probabilities of eating are used to construct lognormal distributions for probability of eating using Crystal Ball™ software. It was decided to use lognormal distributions as the default assumption for the shape of the distribution because it is assumed that the probabilities of consumption for foods are likely to fall in this shape. The lognormal distribution was chosen because it reflects non-negative estimates of probability, the majority of the estimates cluster around the mean, and high probability estimates occur with low frequency as is seen in consumption patterns associated with many foods. When lognormal distributions cannot be constructed, triangular distributions, point estimates or ranges between the estimate from ATDP and CSIS are used. It is recognized that each of these estimates carries with it some limitation in describing the intake probabilities representing intake of foods among Alaska Native communities.

It is important to note that each food, region and season has a separate region- and season-based probability of eating which will be applied to all age groups. It is likely that there are differences in probability of eating between age groups, but at present there is no quantifiable information to inform this variation. Generally, there has been some discussion that there is a "transition" taking place from traditional and subsistence foods towards market foods and that this transition is affecting the youth more often than older generations. This issue can be addressed through the cultural blending capabilities of the LifeLine Customized Dietary Analysis™ Software. However, the issue still remains that there may be differences in probability of eating between generations when considering only traditional and subsistence foods. The assumption that there is no difference is maintained at present and it is highlighted that further investigation of this issue is necessary.

For information as to how each resource differs between species and part and preparation method, please see the food-specific summary spreadsheets available in Appendix H which contain specific information on where proxy information was used, what

percentages were used and further reference information. Detailed information is also available in notes within the spreadsheets. These spreadsheets are available in Appendix H.

These food-specific spreadsheets and commentary information were developed in conjunction with Alaska nutrition expert Betsy Nobmann PhD, RD. They were extensively reviewed and edited during their development for accuracy in describing Alaska Native consumption parameters.

CHAPTER 6. FOOD SPECIFIC INFORMATION

6.1 Introduction

The following sections contain information relevant to each category of food included in the food list. These sections have as their aim to describe in detail the process followed to create the portion size and probability distributions used for the respective foods. An extensive reference list is also available for each type of food.

Because foods included in this food list will not be familiar to every user of this information a detailed discussion of each food category is considered important. Some of the issues addressed in these sections pertains to the amount or type of information available reflecting the food's use, regulations governing use of a resource, patterns of use for the resource, assumptions, suggestions for possible other foods to include in the food list from the category, or areas where further data collection is recommended.

An example of the type of information available in this section follows. Most sea mammals are protected from harvest by anyone who is not Alaska Native. Therefore, it is likely that harvest numbers are much more specific to Alaska Native users than are harvest numbers for berries. The harvest of berries can be undertaken by anyone (Alaska Native or not) and so these estimates should be interpreted with this understanding. Information contained in the following sections will help to clarify the interpretation of the information contained within the files.

6.1.1 SPREADSHEET EXPLANATION

The type of food can be found at the top of each food worksheet. Directly below the food name, portion size data can be found. There is a cell containing the average portion size estimate, along with a note regarding the source of the data. The mean estimates from CINE's reports, along with a standard deviation (when available), and number of

respondents (N) is listed for each age range. The children's age ranges are marked with parentheses indicating the percentages of the adult reference used to calculate the portion size estimates.

- ADFG CSIS reports the harvest of fowl as raw weight. This harvest per user number has been adjusted for cooking losses by applying a factor of 0.75 to the original raw estimate. There is no information regarding weight loss from cooking fowl. The factor of 0.75 for cooking loss is an estimated factor intended to reflect the weight of the edible portion and any potential cooking loss. The only reference held at present is a "yield table" from the National Cattleman's Beef Council which describes cooking losses in beef. This reference reveals cooking yield of 28-75% depending on the type/cut of meat. In the interest of conservative estimates, the 75% yield will be used until better information can be attained.

The rows labeled "distribution" on these food-specific spreadsheets reveals what type of estimate; a point estimate, range, triangular distribution or lognormal distribution, will be entered into the DRG for each food and each season. The parameters entered into the DRG are easily readable off of the spreadsheets. A point estimate will be listed as a single value (point estimate). A range will be listed with the lower bound and the high bound (low bound – high bound). A triangular distribution will be listed with its lower bound (assumed to be zero), the most likely value, and its upper bound (low bound – most likely value – upper bound). When a lognormal distribution is indicated the mean and standard deviation is listed (mean, SD) and there is a cell below it which when viewed in Crystal Ball™ will reveal the complete probability distribution.

6.2 Documentation Specific to Berries/Fruit

6.2.1 TYPES OF BERRIES AND FRUIT INCLUDED IN THE FOOD LIST

- Blueberry/Bog Blueberry, Great bilberry, Bog bilberry, Ahsayevik (name used on Barter Island), Soquah (name used on Seward Peninsula), Sooguk (name used in Shishmaref) – *Vaccinium uliginosum*
- Crowberry, Blackberry,Curlewberry, Ahzayahk (name used in Teller), Boneruk (name used in Noorvik), Panak (name used in Kotzebue and Shishmaref) – *Empetrum nigrum*
- Cranberry –
  - Bog Cranberry, Swamp Cranberry, Wingarat (name used in Lower Kuskokwim) – *Oxycoccus microcarpus*
  - Lowbush Cranberrry, Mountain Cranberry, Lingenberry, Partridgeberry, Keepmingyuk (name used in Shishmaref), Keepmik (name used on Seward Peninsula), Toomalgleet (name used in Lower Kuskokwim) – *Vaccinium vitis idaea*
  - Highbush Cranberry, Squashberry, Mooseberry – *Viburnum edule*
- Salmonberry, Cloudberry, Baked Appleberry, Ahtchaigpiat (name used in Lower Kuskokwim), Akpik (name used in Barter Island, Shishmaref, Kotzebue, Noorvik and Nome) – *Rubus chamaemorus and Rubus spectabilis*
- Elderberry - *Sambucus racemosa*
- Huckleberry – *Vaccinium parvifolium*
- Rose Hips, Wild Rose, Prickly Rose, Neechee – *Rosa acicularis*
- Raspberry – *Rubus idaeus*

6.2.2 GENERAL ASSUMPTIONS

- Berries/fruit will be considered based upon their separate type of berries/fruit collected in Alaska. While residents of Alaska do differentiate between the specific types of cranberry as distinct foods, information is not available to further divide cranberries into lowbush, highbush, etc varieties. The category of cranberry will be used to describe all types of cranberry.

- It is known that berries/fruit are eaten in the raw and cooked forms. Often they are frozen for use later in cobblers or jams. They are a common ingredient in "Eskimo Ice Cream" which varies in its composition, but often contains animal fat and berries. Information regarding preparation method is not available and the user of the Compendium should consider this as the results from this food group are interpreted.

- Several berries are not included in this discussion because they are not included in the ATDP or CSIS databases. Information from the Alaska Cooperative

Extension suggests that other berries are eaten and perhaps should be considered in the analysis. Other berries for consideration include the pacific serviceberry, alpine bearberry, beach strawberry, salal, currants and nagoonberry/wineberry. It is likely that these berries are generally eaten in small amounts or by few people, however, it is suggested that further information be collected regarding these berries.

6.2.3 PORTION SIZE ASSUMPTIONS

- Portion size data are derived from the assessments done by CINE about Yukon First Nations' and Inuit dietary practices. Specific information on portion sizes consumed by Alaskans is lacking, so Canadian data are used as proxies. For each age group a mean portion size, standard deviation and number of respondents are listed on the spreadsheets. Only point estimates are available from data from the Inuit studies, so point estimates will be used with reference to berries.

- When no information regarding portion size is available, a proxy number will be used (proxy numbers can be identified in the spreadsheets by cells having a number of respondents of zero and they are referenced to their source by a note within the cell). The "Berries Summary Spreadsheet" available in Appendix H also identifies the source of the proxy information.

- An average portion size is assigned for the purposes of determining the number of eating events. Estimates specific to the type of berries are used to calculate a weighted average for use as the average portion size. The average portion size is indicated in the top portion of each spreadsheet and on the "Berries Summary Spreadsheet."

- In cases where nineteen year olds are not accounted for in the data from Receveur et al., they will be grouped into the portion size groups with adults, 20-40y. In some cases portion size estimates do include 19 year olds and this information will then be used.

- It is assumed that portion sizes will remain consistent throughout the year. While this assumption is probably not fully accurate, it is the best assumption that is available given that there is no information to quantitatively describe how portion sizes fluctuate during the year. It is likely that when fresh berries are available (in the summer and fall), larger portions are eaten, but at this time no data are available to define the magnitude of this change.

- Since there is no information regarding portion sizes in children, portion sizes for children are handled using a scale that was developed based upon the Institute of Medicine, Dietary Reference Intakes. This scale uses estimated energy needs to determine what percent of an adult's portion size will be assigned to children of different age groups. For example, estimated energy needs for a female child age 2-3 are 50% of the estimated energy needs of a female adult 20-40. In this case, a portion size for an adult female age 20-40 would be reduced by ½ for a child in this age group. A factor was calculated for each age group and applied to the mean as well as the standard deviation to calculate portion size distributions or point estimates for children based upon an adult reference group. The factors used are listed in Appendix G.

- The age groups according to the IOM do not correlate exactly with the age groups in the Dietary Record Generator™ (DRG). The factor calculated for children age 2-3 based on IOM recommendations is applied to children age 1-2 in the DRG, the factor for children age 4-8 based on IOM recommendations is applied to children age 3-5 in the DRG, the factor for children age 9-13 based on IOM recommendations is applied to children age 6-12 in the DRG and the factor for children age 14-18 based on IOM recommendations is applied to children age 13-19 in the DRG.

6.2.4 PROBABILITY OF EATING ASSUMPTIONS

- Each region and season shows a single calculated probability of eating a specific food which will be applied to all age groups. It is likely that younger generations eat fewer of some subsistence foods than do the older generations as market foods

become more available. However, there is no quantitative data to inform how age affects probability of eating. In the interest of being conservative, it will be assumed that the probability of eating will apply to all age groups.

- Harvest estimates from the Community Subsistence Information System are calculated as pounds of resource per user per year. The "user" is defined as a person within a family unit which reports that they used the resource. The family does not have to have hunted or gathered the resource to report that they use the resource. This is important because it is well documented that in some cases the number of people hunting/gathering a resource is much smaller than those who use it. The distribution network of traditional foods is extensive in most locations. Households surveyed by ADFG who report using a resource are multiplied by the average number of people in a household for that specific community and this number is the "denominator" or the number of users in the community.

- "Users" of resources are not necessarily only Alaska Natives but rather are residents of Alaska who harvest under subsistence regulations. In rural communities, a larger percentage of the population is likely to be Alaska Native than in urban centers. In most rural regions, the harvest data may be fairly representative of intake in Alaska Native populations, as the number of non-native residents using traditional resources will be small. However, in urban centers, the mix of Native and non-native people is much more significant and therefore the harvest number will represent this mix of users. Native and non-native "users" are likely to use resources differently from one another. Urban and rural Alaska Native users may also use resources differently. This effect may be fairly substantial when considering the use of berries which are widely used by both Alaska Native and non-Alaska Native populations.

- ADFG CSIS reports the harvest of berries as raw weight. While most other resources have been adjusted for cooking losses, the raw weight of berries will be used. There is no information to tell how much of the berries are eaten raw, how

much is cooked in the form of a cobbler or made into jams/jellies. It is likely that a high percentage of the berries are eaten in the raw form. Berries are commonly used in "Eskimo Ice Cream" or "Indian Ice Cream" recipes (agutuk) and this dish does not require the berries to be cooked.

- ADFG CSIS also reports the total weight of berries harvested without respect to type of berry in all zones except for the Arctic Subarctic Coast. In the case of the Arctic Subarctic Coast, numbers from CSIS are used relevant to the types of berries. In all other regions the total amount of berries reported to be harvested is shown in the heading and a percentage of the total (based upon the percentages seen in the ATDP) is applied to get an estimate. The percentages were calculated using the ATDP estimates for each region. Each cell which contains a calculated number is described by a note within the cell.

- It is difficult to determine how areas surveyed by the ATDP should be applied to the Ecological-Cultural Zones. The areas surveyed by the ATDP do not exactly fit the Zones used in the creation of the Alaska Compendium of Dietary Files. Recognizing that these estimates are not specific for the Zones, the Subarctic Interior Zone is assigned an average consumption from the Tanana Chiefs Conference (TCC) and the Yukon Kuskokwim Health Corporation (YKHC); the Arctic/Subarctic Coastal Zone is assigned an average consumption from the YKHC, Bristol Bay Area Health Corporation (BBAHC), and Norton Sound Health Corporation (NSHC); the South East Zone is assigned estimates from the Southeast Alaska Regional Health Consortium (SEARHC); and the Aleutian Pacific Zone is assigned an average from the BBAHC and the SEARHC.

- When mean estimates from the ATDP are averaged to better fit the zones used in the Alaska Compendium of Dietary Files, the highest maximum value is preserved (not averaged with other maximum estimates) in order that the high end consumer is represented in the files.

- Depending on the resource under consideration, CSIS numbers may be a more specific estimate of consumption of the resource in a given zone due to the

manipulation of the estimates from the ATDP. This is probably the case in zones where the estimates from different ATDP regions were very different. The average may not be an accurate representation of the true consumption in the zone. Estimates from the ATDP may be more accurate estimates of consumption given that it measures consumption and not harvest as a proxy. This is probably true in instances where the resource is used for more than just human food (dog food, Native crafts, etc) causing the harvest number to overestimate the true consumption. This effect is probably not significant with berries and fruit. Given the manipulation necessary for both sets of data, it is important to compare estimates from both sources and to note that often they fall very close to one another. Where this is the case, a fair degree of certainty can be given to the estimate. When the estimates are very divergent, more data are necessary.

- In ideal situations, a distribution would be available for probability of eating. When this is not available the ranges between ATDP mean, ATDP max and CSIS estimates will be used in place of a distribution or point estimate. The lowest and highest estimates are used as the end points of the range. These numbers are estimates carrying no information related to the spread or centrality of these numbers and should be interpreted with caution.

6.2.5 PROBABILITY OF EATING CALCULATIONS

- The calculation begins with average (from CSIS or ATDP) or maximum (from ATDP) total pounds of the specific resource per person (user) per year.

- Pounds per user per year are converted into number of eating events per year using the following equation. Pounds of resource X 454 g / average serving size (g).

- The calculated number of eating events is then subdivided into seasons based upon what is known about harvest patterns and seasonality of eating the resource. Berries vary widely in their availability and use but are usually consumed in the

summer and fall when they ripen. The seasonality of eating the resource can be determined using the "Berries Summary Spreadsheet."

- The number of eating events in each season is divided by 91 (91 days assumed in each season) to get the probability of eating on any one day.

- When a mean and maximum probability of eating is available, Crystal Ball™ software is used to convert these means and maximums into lognormal distributions. Otherwise triangular distributions, ranges or point estimates are used to describe probability of consumption.

- Specific information on how the use of berries differs between region and season, please see the "Berries Summary Spreadsheet" which contains specific information on where proxy information was used, what percentages were used and reference information.

6.2.6 REFERENCES

Kuhnlein, H., Receveur, O., Chan, H., & Loring, E. (2000). *Assessment of Dietary Benefit/Risk in Inuit Communities*. Centre for Indigenous Peoples' Nutrition and Environment, Macdonald Campus of McGill University.

Receveur, O., Kassi, H., Chan, P., Berti, H., & Kuhnlein, H. (1998). *Yukon First Nations' Assessment of Dietary Benefit/Risk*. Centre for Indigenous Peoples' Nutrition and Environment, Macdonald Campus of McGill University.

The Institute of Medicine and the Food and Nutrition Board. (2005). *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids (Macronutrients)*. The National Academies Press, Washington, D.C.

Alaska Department of Fish and Game, Community Subsistence Information System. (2006). Harvest per user calculated by special request for The Tribal Lifeline™ project. Anchorage, AK.

Ballew, C., Ross, A., Wells, R., Hiratsuka, V., et al. (2004). *Final Report on the Alaska Traditional Diet Survey*, Alaska Native Epidemiology Center, Alaska Native Health Board. Retrieved from http://24.237.7.166/epicenter/pdf/traditional_diet.pdf

Alaska Department of Fish and Game, Division of Subsistence, United States Government. Anchorage, AK. Subsistence Technical Paper Series. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

University of Alaska Fairbanks Cooperative Extension. (1993). *Wild Edible and Poisonous Plants of Alaska*. University of Alaska Fairbanks, Fairbanks, AK.

Northern Adventures Publications. (1996). *Wild Alaskan Recipes and Hints*. Northern Adventure Publications, Wasilla, AK.

6.3 Documentation Specific to Fish Roe

6.3.1 TYPES OF FISH ROE INCLUDED IN THE FOOD LIST

- Whitefish - *genera Prosopium and Coregonus*
- Burbot, Loche, Lawyer, Ell pout, Methy, Lush, Mud shark - *Lota lota*
- Grayling - *Thymallus arcticus*
- Herring - *Clupea pallasi*
  - *Herring roe on kelp*
  - *Herring roe on hemlock*
  - *Herring roe on hair seaweed*
  - *Herring sac roe*
- Pike - *Esox lucius Linnaeus*
- Sheefish, Iconnu - *Stendous leucichthys nelma*
- Salmon – *oncorhynchus keta, oncorhynchus tshawytscha, oncohynchus gorbuscha, oncorhynchus nerka, oncorhynchus kisutch.*

6.3.2 GENERAL ASSUMPTIONS:

- Aside from herring roe, use of roe is poorly described by the available data sources.

- It is known that some of the roe is eaten raw, boiled, fried, dried and dried and reconstituted. There is no information available to know how much roe is prepared using these distinct methods. Roe will be considered without designation of preparation method. The user of the files should consider results regarding fish roe with caution given that very little specific information is available.

6.3.3 PORTION SIZE ASSUMPTIONS

- Portion size data are derived from the assessments done by CINE Inuit dietary practices. Specific information on portion sizes consumed by Alaskans is lacking, so Canadian data are used as proxies. For each age group a mean portion size, standard deviation, and number of respondents are listed on the spreadsheets when this information is available and will be used to inform a distribution. When only point estimates are available, they will be used in place of a distribution (point estimates can be identified by cells which have an N of one).

- When no information regarding portion size is available, a proxy number will be used (proxy numbers can be identified in the spreadsheets by cells having an number of respondents of zero and they are referenced to their source by a note within the cell) The "Fish Roe Summary Spreadsheet," found in Appendix H, also identifies the source of the proxy information.

- An average portion size is assigned for the purposes of determining the number of eating events. A weighted average is calculated and used as the average portion size. The average portion size is indicated in the top portion of each spreadsheet and on the "Fish Roe Summary Spreadsheet."

- In cases where nineteen year olds are not accounted for in the data from Receveur et al., they will be grouped into the portion size groups with adults, 20-40y. In some cases portion size estimates do include 19 year olds and this information will then be used.

- It is assumed that portion sizes will remain consistent throughout the year. While this assumption is probably not fully accurate, it is the best assumption that is available given that there is no information to quantitatively describe how portion sizes fluctuate during the year. It is likely that when fresh roe is available, larger portions are eaten, but at this time no data are available to define the magnitude of this change.

- Since there is no information regarding portion sizes in children, portion sizes for children are handled using a scale that was developed based upon the Institute of Medicine, Dietary Reference Intakes. This scale uses estimated energy needs to determine what percent of an adult's portion size will be assigned to children of different age groups. For example, estimated energy needs for a female child age 2-3 are 50% of the estimated energy needs of a female adult 20-40. In this case, a portion size for an adult female age 20-40 would be reduced by ½ for a child in this age group. A factor was calculated for each age group and applied to the mean as well as the SD to calculate portion size distributions or point estimates for children based upon an adult reference group. The factors used are listed in Appendix G.

- The age groups according to the IOM do not correlate exactly with the age groups in the Dietary Record Generator (DRG). The factor calculated for children age 2-3 based on IOM recommendations is applied to children age 1-2 in the DRG, the factor for children age 4-8 based on IOM recommendations is applied to children age 3-5 in the DRG, the factor for children age 9-13 based on IOM recommendations is applied to children age 6-12 in the DRG, and the factor for children age 14-18 based on IOM recommendations is applied to children age 13-19 in the DRG.

6.3.4 PROBABILITY OF EATING ASSUMPTIONS

- Each region and season shows a single calculated probability of eating a given food which will be applied to all age groups. It is likely that younger generations eat fewer of some subsistence foods than do the older generations as market foods become more available. However, there is no quantitative data to inform how age affects probability of eating. In the interest of being conservative, it will be assumed that the probability of eating will apply to all age groups.

- Harvest estimates from the Community Subsistence Information System are calculated as pounds of resource per user per year. The "user" is defined as a person within a family unit which reports that they used the resource. The family

does not have to have hunted or gathered the resource to report that they use the resource. This is important because it is well documented that in some cases the number of people hunting/gathering a resource is much smaller than those who use it. The distribution network of traditional foods is extensive in most locations. Households surveyed by ADFG who report using a resource are multiplied by the average number of people in a household for that specific community and this number is the "denominator" or the number of users in the community.

- "Users" of resources are not necessarily only Alaska Natives but rather are residents of Alaska who harvest under subsistence regulations. In rural communities, a larger percentage of the population is likely to be Alaska Native than in urban centers. In most rural regions, the harvest data may be fairly representative of intake in Alaska Native populations, as the number of non-native residents using traditional resources will be small. However, in urban centers, the mix of Native and non-native people is much more significant and therefore the harvest number will represent this mix of users. Native and non-native "users" are likely to use resources differently from one another. Urban and rural Alaska Native users may also use resources differently.

- ADFG CSIS reports the harvest of roe as raw dressed weight. From a "western" standpoint, this may be thought of as the raw weight of a food when it comes from the grocery store. This harvest per user estimate has been adjusted for cooking/drying/cleaning losses by applying a factor of 0.75 to the original estimate from ADFG. There is no information regarding weight loss from cooking/drying roe. The factor of 0.75 for cooking/drying loss is an estimated factor and should in reality reflect a greater "reduction" in weight. This issue is complicated by the fact that fat content of the resource, cooking method, drying time, drying conditions, etc will all influence how much weight is lost in the process. The only reference held at present is a "yield table" from the National Cattleman's Beef Council which describes cooking losses in beef. This reference reveals cooking yield of 28-75% depending on the type/cut of meat. In the

interest of conservative estimates, the 75% yield will be used until better information can be attained.

- No estimates of roe consumption from the Alaska Traditional Diet Survey are reported and aside from herring roe, no roe harvest is reported by the CSIS. It is known that the roe is consumed and should be considered. Therefore, an assumption is made that the same probability of eating associated with the fish liver will be used as a proxy estimate for the probability of eating the same species of fish roe. This is only an estimate based upon an assumption and should be interpreted as such. Please see the discussion on fish liver for a specific discussion of how those probabilities were calculated.

- For herring roe, the average total pounds per user as calculated from the CSIS are shown within the cells of the spreadsheets.

6.3.5 PROBABILITY OF EATING CALCULATIONS (FOR HERRING ROE)

- The calculation begins with average (from CSIS) total pounds of the specific resource per person (user) per year.

- Pounds per user per year are converted into number of eating events per year using the following equation. Pounds of resource X 454 g / average serving size (g).

- The calculated number of eating events is then subdivided into seasons based upon what is known about harvest patterns and seasonality of eating the resource. Fish varies widely in its availability and use. The seasonality of eating the resource can be determined using the "Fish Roe Summary Spreadsheet."

- The number of eating events in each season is divided by 91 (91 days assumed in each season) to get the probability of eating on any one day.

- Specific information on how the use of roe differs between region and season, please see the "Fish Roe Summary Spreadsheet" which contains specific information on where proxy information was used, what percentages were used, and reference information.

6.3.6 REFERENCES

Kuhnlein, H., Receveur, O., Chan, H., & Loring, E. (2000). *Assessment of Dietary Benefit/Risk in Inuit Communities*. Centre for Indigenous Peoples' Nutrition and Environment, Macdonald Campus of McGill University.

The Institute of Medicine and the Food and Nutrition Board. (2005). *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids (Macronutrients).* The National Academies Press, Washington, D.C.

Alaska Department of Fish and Game, Community Subsistence Information System. (2006). Harvest per user calculated by special request for The Tribal Lifeline project. Anchorage, AK.

Ballew, C., Ross, A., Wells, R., Hiratsuka, V., et al. (2004) *Final Report on the Alaska Traditional Diet Survey,* Alaska Native Epidemiology Center, Alaska Native Health Board. Retrieved from http://24.237.7.166/epicenter/pdf/traditional_diet.pdf

Alaska Department of Fish and Game, Division of Subsistence, United States Government. Anchorage, AK. Subsistence Technical Paper Series. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Alaska Department of Fish and Game. *Wildlife Notebook*. Division of Subsistence. Juneau, AK. Retrieved from http://www.adfg.state.ak.us/pubs/notebook/notehome.php

Alaska Department of Fish and Game. (2005). *Alaska Subsistence Fisheries 2003 Annual Report*. Division of Subsistence. Juneau, AK.

Cattlemen's Beef Board and National Cattlemen's Beef Association. (2006). *How Much To Buy*. Retrieved from http://www.beefitswhatsfordinner.com/aboutbeef/pdf/HowMuchToBuyTable.pdf

Brown, C., Burr, J., Elkin, K., & Walker, R. (2005). *Contemporary Subsistence Uses and Population Distribution of Non-Salmon Fish in Grayling, Anvik, Shageluk, and Holy Cross. Technical Paper 289*. Division of Subsistence, Alaska Department of

Fish and Game. Fairbanks, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Georgette, S. and A. Shiedt. (2005). *Whitefish: Traditional Ecological Knowledge and Subsistence Fishing in the Kotzebue Sound Region, Alaska Technical Paper 290.* Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Schroeder, R. and M. Kookesh. (1990). *Subsistence Harvest of Herring Eggs in Sitka Sound. Technical Paper 173.* Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Wright, J. and M. Chythlook. (1985). *Subsistence Harvests of Herring Spawn-on-Kelp in the Togiak District of Bristol Bay. Technical Paper 116*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

6.4 Documentation Specific to Non-Salmon Fish

6.4.1 TYPES OF NON-SALMON FISH INCLUDED IN THE FOOD LIST

Whitefish to include: Arctic Cisco, Bering Cisco, Least Cisco, Broad Whitefish, Round Whitefish, and Pygmy Whitefish) - *genera Prosopium and Coregonus*

Trout – Brook - *Salvelinus fontinalis*

- Cutthroat - *Oncorhynchus clarkia*
- Dolly Varden - *Salvelinus malma Walbaum*
- Lake - *Salvelinus namaycush*
- Rainbow - *Oncorhynchus mykiss*
- Steelhead - *Oncorhynchus mykiss (rainbow trout having spent time in ocean)*

Cod - *Gadus macrocephalus*

Blackfish - *Dallia pectoralis*

Burbot, Loche, Lawyer, Ell pout, Methy, Lush, Mud shark - *Lota lota*

Grayling - *Thymallus arcticus*

Halibut - *Hippoglossus stenolepis*

Herring - *Clupea pallasi*

Hooligan, Candlefish, Euchalon - *Thaleichtys pacificus*

Irish Lord, Sculpin - *Cottus cognatus*

Lamprey, Eel - *Petromyzontidae*

Ling Cod - *Ophiodon elong-atus*

Needlefish, Stickleback – *Ammodytes hexapterus*

Pike - *Esox lucius linnaeus*

Rockfish - *Sebastes sp.*

Sheefish, Iconnu - *Stendous leucichthys nelma*

Smelt - *Family: Osmeridae*

Sole – *Pleuronectes sp.*

Sucker, Long Noesed Sucker - *Catostomus catostomus*

Tomcod, Arctic Cod - *Microgadus proximus*

6.4.2 GENERAL ASSUMPTIONS

It is assumed that fish are eaten in several forms. Depending on the specific fish, several forms may be listed to include the cooked form, dry form and raw/frozen form, and the head/eyes/cheeks and/or liver.

6.4.3 PORTION SIZE ASSUMPTIONS

- Portion size data are derived from the assessments done by CINE about Yukon First Nations, Inuit and Dene Metis dietary practices. Specific information on portion sizes consumed by Alaskans is lacking, so Canadian data are used as proxies. For each age group a mean portion size, standard deviation and number of respondents are listed on the spreadsheets when this information is available and will be used to inform a distribution. When only point estimates are available, they will be used in place of a distribution (point estimates can be identified by cells which have an N of 1).

- When no information regarding portion size is available, a proxy number will be used (proxy numbers can be identified in the spreadsheets by cells having a number of respondents of zero and they are referenced to their source by a note

within the cell). The "Fish Summary Spreadsheet", found in Appendix H, also identifies the source of the proxy information.

- An average portion size is assigned for the purposes of determining the number of eating events. The portion size for fish and dry fish was given in Receveur's text (1998, pg 19) and an average of the estimates for men and women was used. When estimates specific to the type of fish are available, a weighted average is calculated and used as the average portion size. The average portion size is indicated in the top portion of each spreadsheet and on the "Fish Summary Spreadsheet," available in Appendix H.

- In cases where nineteen year olds are not accounted for in the data from Receveur et al., they will be grouped into the portion size groups with adults, 20-40y. In some cases portion size estimates do include 19 year olds and this information will then be used.

- It is assumed that portion sizes will remain consistent throughout the year. While this assumption is probably not fully accurate, it is the best assumption that is available given that there is no information to quantitatively describe how portion sizes fluctuate during the year. It is likely that when fresh fish is available, larger portions are eaten, but at this time no data are available to define the magnitude of this change.

- Since there is no information regarding portion sizes in children, portion sizes for children are handled using a scale that was developed based upon the Institute of Medicine, Dietary Reference Intakes. This scale uses estimated energy needs to determine what percent of an adult's portion size will be assigned to children of different age groups. For example, estimated energy needs for a female child age 2-3 are 50% of the estimated energy needs of a female adult 20-40. In this case, a portion size for an adult female age 20-40 would be reduced by ½ for a child in this age group. A factor was calculated for each age group and applied to the mean as well as the standard deviation to calculate portion size distributions or

point estimates for children based upon an adult reference group. The factors used are listed in Appendix G.

- The age groups according to the IOM do not correlate exactly with the age groups in the Dietary Record Generator™ (DRG). The factor calculated for children age 2-3 based on IOM recommendations is applied to children age 1-2 in the DRG, the factor for children age 4-8 based on IOM recommendations is applied to children age 3-5 in the DRG, the factor for children age 9-13 based on IOM recommendations is applied to children age 6-12 in the DRG, and the factor for children age 14-18 based on IOM recommendations is applied to children age 13-19 in the DRG.

6.4.4 PROBABILITY OF EATING ASSUMPTIONS

- Each region and season showsa single calculated probability of eating which will be applied to all age groups. It is likely that younger generations eat fewer of some subsistence foods than do the older generations as market foods become more available. However, there are no quantitative data to inform how age affects probability of eating. In the interest of being conservative, it is assumed that the probability of eating will apply to all age groups.

- Harvest estimates from the Community Subsistence Information System are calculated as pounds of resource per user per year. The "user" is defined as a person within a family unit which reports that they used the resource. The family does not have to have hunted or gathered the resource to report that they use the resource. This is important because it is well documented that in some cases the number of people hunting/gathering a resource is much smaller than those who use it. The distribution network of traditional foods is extensive in most locations. Households surveyed by ADFG who report using a resource are multiplied by the average number of people in a household for that specific community and this number is the "denominator" or the number of users in the community.

- "Users" of resources are not necessarily only Alaska Natives but rather are residents of Alaska who harvest under subsistence regulations. In rural communities, a larger percentage of the population is likely to be Alaska Native than in urban centers. In most rural regions, the harvest data may be fairly representative of intake in Alaska Native populations, as the number of non-native residents using traditional resources will be small. However, in urban centers, the mix of Native and non-native people is much more significant and therefore the harvest number will represent this mix of users. Native and non-native "users" are likely to use resources differently from one another. Urban and rural Alaska Native users may also use resources differently. This affect may be fairly substantial when considering the use of some fish which are widely used by both Alaska Native and non-Alaska Native populations.

- ADFG CSIS reports the harvest of fish as raw dressed weight. From a "western" standpoint, this may be thought of as the raw weight of a fish when it comes from the grocery store. This harvest per user estimate has been adjusted for cooking/cleaning losses by applying a factor of 0.75 to the original estimate from ADFG. There is no information regarding weight loss from cooking/drying fish. The factor of 0.75 for cooking/drying loss is an estimated factor and should in reality reflect a greater "reduction" in weight. This issue is complicated by the fact that fat content of the resource, cooking method, drying time, drying conditions, etc will all influence how much weight is lost in the process. The only reference held at present is a "yield table" from the National Cattleman's Beef Council which describes cooking losses in beef. This reference reveals a cooking yield of 28-75% depending on the type/cut of meat. In the interest of conservative estimates, the 75% yield will be used until better information can be attained. In the case of raw or frozen fish a cooking loss would not apply, the 0.75 factor is "undone" by applying a factor of 1.25 to CSIS harvest numbers.

- The average total pounds per user as calculated from the Alaska Traditional Diet Project are shown within the cells of the spreadsheets and include all preparation methods and parts of the resource. This may include dry, cooked, raw/frozen, fish

head/eyes/cheeks, and fish liver. In some cases, dry and "other" forms of the fish may be reported and in other cases, just the type of fish is reported without any further detail as to what preparation method or parts are being eaten. In order to deal with this issue, a proxy set of percentages may be used to divide up the total consumption or harvest amount into component preparation methods or parts which are based upon a fish assumed to be eaten in similar ways. For example, according to salmon data from the ATDP, cooked salmon represents 27%, dry salmon represents 52%, and raw/frozen salmon represents 21% of the total salmon consumed. It is known that fish head and liver are also eaten and should be considered in the assessment. These percentages are adjusted to reflect this piece of information and it is assumed that fish head is 5%, and fish liver is 3% of the total harvest or consumption number. This set of percentages is applied to the harvest estimate for salmon from the CSIS and is also applied to a fish (grayling for example) which does not have any information available regarding its preparation methods or parts eaten.

- The calculated percentages explained above in the example, are modified according to what is known about a fish and how it is eaten and reviewed by Alaskan experts. These modifications are noted and documented on the "Fish Summary Spreadsheet."

- In some cases (for example, trout), dividing the fish up using percentages which are proxies from another fish proved that the numbers became too small and therefore insignificant to describe any consumption. It was obvious that dividing the estimates to this degree of detail left almost all probabilities of eating any one part or preparation method at zero. In these cases, categories such as "other" remain and the user of the Compendium file must decide how to interpret this information in regard to this resource.

- It is difficult to determine how areas surveyed by the ATDP should be applied to the Ecological-Cultural Zones. The areas surveyed by the ATDP do not exactly fit the Zones used in the creation of the Alaska Compendium of Dietary Files.

Recognizing that these estimates are not specific for the Zones, the Subarctic Interior Zone is assigned an average consumption from the Tanana Chiefs Conference (TCC) and the Yukon Kuskokwim Health Corporation (YKHC); the Arctic/Subarctic Coastal Zone is assigned an average consumption from the Yukon-Kuskokwim Health Corporation (YKHC), Bristol Bay Area Health Corporation (BBAHC), and Norton Sound Health Corporation (NSHC); the South East Zone is assigned estimates from the Southeast Alaska Regional Health Consortium (SEARHC); and the Aleutian Pacific Zone is assigned an average from the Bristol Bay Area Health Corporation (BBAHC) and the Southeast Alaska Regional Health Consortium (SEARHC).

- When mean estimates from the ATDP are averaged to better fit the zones used in the Alaska Compendium of Dietary Files, the highest maximum value is preserved (not averaged with other maximum estimates) in order that the high end consumer is represented in the files.

- Depending on the resource under consideration, CSIS numbers may be a more specific estimate of consumption of the resource in a given zone due to the manipulation of the estimates from the ATDP. This is probably the case in zones where the estimates from different ATDP regions were very different. The average may not be an accurate representation of the true consumption in the zone. Estimates from the ATDP may be more accurate estimates of consumption given that it measures consumption and not harvest as a proxy. This is probably true in instances where the species is used for more than just human food (dog food, Native crafts, etc) causing the harvest number to overestimate the true consumption. Given the manipulation necessary for both sets of data, it is important to compare estimates from both sources and to note that often they fall very close to one another. Where this is the case, a fair degree of certainty can be given to the estimate. When the estimates are very divergent, more data is necessary.

- In ideal situations, a distribution would be available to describe probability of eating. When this is not available, a range or a point estimate is used.

6.4.5 PROBABILITY OF EATING CALCULATIONS

- The calculation begins with average (from CSIS or ATDP) or maximum (from ATDP) total pounds of the specific resource per person (user) per year.

- Pounds per user per year are converted into number of eating events per year using the following equation. Pounds of resource X 454 g / average serving size (g).

- The calculated number of eating events is then subdivided into seasons based upon what is known about harvest patterns and seasonality of eating the resource. Fish varies widely in its availability and use. The seasonality of eating the resource can be determined using the "Fish Summary Spreadsheet."

- The number of eating events in each season is divided by 91 (91 days assumed in each season) to get the probability of eating on any one day.

- When a mean and maximum probability of eating is available, Crystal Ball™ software is used to convert these means and maximums into lognormal distributions. When this is not possible, triangular distributions, ranges or point estimates are used as the estimate for probability of eating.

- Specific information on how the use of fish differs between region and season, please see the "Fish summary spreadsheet" which contains specific information on where proxy information was used, what percentages were used, and reference information.

6.4.6 REFERENCES

Receveur, O., Kassi, H., Chan, P., Berti, H. and Kuhnlein, H. (1998). *Yukon First Nations' Assessment of Dietary Benefit/Risk*. Centre for Indigenous Peoples' Nutrition and Environment, Macdonald Campus of McGill University.

Receveur, O., Boulay, M., Mills, C., Carpenter, W. and Kuhnlein, H. (1996). *Variance in Food Use in Dene/Metis Communities*. Centre for Indigenous Peoples' Nutrition and Environment, Macdonald Campus of McGill University.

Kuhnlein, H., Receveur, O., Chan, H. and Loring, E. (2000). *Assessment of Dietary Benefit/Risk in Inuit Communities.* Centre for Indigenous Peoples' Nutrition and Environment, Macdonald Campus of McGill University.

The Institute of Medicine and the Food and Nutrition Board. (2005). *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids (Macronutrients).* The National Academies Press, Washington, D.C.

Alaska Department of Fish and Game, Community Subsistence Information System. (2006). Harvest per user calculated by special request for The Tribal Lifeline™ Project. Anchorage, AK.

Ballew, C., Ross, A., Wells, R., Hiratsuka, V., et al. (2004) *Final Report on the Alaska Traditional Diet Survey*, Alaska Native Epidemiology Center, Alaska Native Health Board. Retrieved from http://24.237.7.166/epicenter/pdf/traditional_diet.pdf.

Alaska Department of Fish and Game, Division of Subsistence, United States Government. Anchorage, AK. Subsistence Technical Paper Series. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Alaska Department of Fish and Game. *Wildlife Notebook.* Division of Subsistence. Juneau, AK. Retrieved from http://www.adfg.state.ak.us/pubs/notebook/notehome.php.

Alaska Department of Fish and Game. (2005). *Alaska Subsistence Fisheries 2003 Annual Report*. Division of Subsistence. Juneau, AK.

Cattlemen's Beef Board and National Cattlemen's Beef Association. (2006). *How Much To Buy*. Retrieved from http://www.beefitswhatsfordinner.com/aboutbeef/pdf/HowMuchToBuyTable.pdf.

Brown, C., Burr, J., Elkin, K. and Walker, R. (2005). *Contemporary Subsistence Uses and Population Distribution of Non-Salmon Fish in Grayling, Anvik, Shageluk,*

and Holy Cross. Technical Paper 289. Division of Subsistence, Alaska Department of Fish and Game. Fairbanks, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Fall, J., M. George, and B. Easley. (2005). *Subsistence Harvests of Pacific Halibut in Alaska, 2004. Technical Paper 304*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Krieg, T., M. Chythlook, P. Coiley-Kenner, D. Holen, K. Kamletz and H. Nicholson. (2005). *Freshwater Fish Harvest and Use in Communities of the Kvichak Watershed, 2003*. Technical Paper 297. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Fall, J., R. Stanek, B. Davis, L. Williams and R. Walker. (2004). *Cook Inlet Customary and Traditional Subsistence Fisheries Assessment. Technical Paper 285*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Andersen, D., C. Brown, R. Walker and K. Elkin. (2004). *Traditional Ecological Knowledge and Contemporary Subsistence Harvest of Non-Salmon Fish in the Koyukuk River Drainage, Alaska. Technical Paper 282*. Division of Subsistence, Alaska Department of Fish and Game. Fairbanks, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Kenner, P., M. Chythlook, J. Fall, L. Brown and C. Utermohle. (1999). *Harvest of Fish Other Than Salmon by the Communities of Pedro Bay and Levelock, Southwest Alaska, April 1996 - March 1997 Technical Paper 247*. Division of Subsistence, Alaska Department of Fish and Game. Anchorage, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Hutchinson-Scarbrough, L. and J. Fall. (1995). *An Overview of Subsistence Salmon and Other Finfish Fisheries of the Chignik Management Areas, Alaska Peninsula. Technical Paper 230*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Pete, M. (1992). *1992 Herring Survey Report. Technical Paper 221*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Betts, M. (1994). The *Subsistence Eulachon Fishery of the Chilkat and Chilkoot Rivers, Southeast Alaska. Technical Paper 213*. Division of Subsistence, Alaska

Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Pete, M. (1991). *Subsistence Herring Fishing in the Nelson and Nunivak Island Districts, 1991. Technical Paper 211*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Pete, M. (1990). *Herring Survey Report. Technical Paper 196*. Division of Subsistence, Alaska Department of Fish and Game. Fairbanks, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Pete, M. (1991). *Subsistence Herring Fishing in the Eastern Bering Sea Region: Nelson Island, Nunivak Island and Kuskokwim Bay. Technical Paper 192*. Division of Subsistence, Alaska Department of Fish and Game. Fairbanks, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Seitz, J. (1996). *The Use of Fish and Wildlife in Clark's Point, Alaska, 1990. Technical Paper 186*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Fall, J., R. Stanek, L. Brown and C. Utermohle. (1996). *The Harvest and Use of Fish, Wildlife, and Plant Resources in False Pass, Unimak Island, Alaska. Technical Paper 183*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Marcotte, J., P, Wheeler, C. Scott and C. Alexander. (1992*). Fish and Game Use by Residents of Five Upper Tanana Communities, 1987-88. Technical Paper 168.* Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Fall, J., M. Chythlook, J. Schichnes and J. Morris. (1996). *An* Overview *of the Harvest and Use of Freshwater Fish by Communities of the Bristol Bay Region, Southwest Alaska. Technical Paper 166*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

George, G. and R. Bosworth. (1988). *Use of Fish and Wildlife by Residents of Angoon, Admiralty Island, Alaska. Technical Paper 159*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Coffing, M. (1991). *Kwethluk Subsistence: Contemporary Land Use Patterns, Wild Resource Harvest and Use and the Subsistence Economy of a Lower Kuskokwim*

River Area Community. Technical Paper 157. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Andrews, E. (1988). *Use of Fish and Wildlife Resources in Minto, Alaska. Technical Paper 137*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Marcotte, J. and T. Haynes. (1985). *Contemporary Resource Use in the Upper Koyukuk Region, Alaska. Technical Paper 93*. Division of Subsistence, Alaska Department of Fish and Game. Fairbanks, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

U.S. Fish and Wildlife Service, Alaska. Kenai National Wildlife Refuge Webpage. Retrieved from http://kenai.fws.gov/Wildlife/fish/fish.htm

6.5 Documentation Specific to Fowl

6.5.1 TYPES OF FOWL INCLUDED IN THE FOOD LIST

Sandhill Crane - *Grus canadensis*

Duck

- American Widgeon - *Anas americana*
- Mallard - *Anas platyrhyncos*
- Harlequin – *Histronicus histronicus*
- Northern Pintail, Kurugaq - *Anas acuta*
- Northern Shoveler - *Anas clypeata*
- Scaup - *Aythya marila*
- Canvasback - *Aythya valisineria*
- Green Winged Teal - *Anas crecca*
- Merganser - *Mergus merganser*
- Bufflehead - *Bucephala albeola*
- Old Squaw, Aaghaaliq - *Clangula hyemalis*
- Goldeneye - *Bucephala clangula*
- Scoter – *Melanitta*
- Eider (To include: King Eider, Spectacled Eider, Common Eider and Steller's Eider) – *Somateria and Polysticta*

Cormorant, Shag – *Phalacrocorax*

Goose

- Canada Goose, Iqsragutilik – *Branta canadensis*

- Emperor Goose – *Chen canagica*
- Brandt, Niglingaq – *Branta bernicla nigricans*
- Greater White Fronted Goose – *Anser albifrons*
- Lesser Snow Goose, Kanuq – *Chen caerulescens caerulescens*

Ptarmigan (To include: WillowPtarmigan, Rock or Mountain Ptarmigan and White Tailed Ptarmigan) – *Lagopus*

Loon (To include: Common Loon, Yellow-billed Loon, Red-throated Loon, Pacific Loon and Arctic Loon) - *Gavia*

Tern (To include: Arctic Tern, Aleutian Tern and CaspianTern) - *Sterna*

Gull (To include: Glaucous Winged Gull, Glaucuous Gull and Herring Gull) - *Larus*

Murre (To include: Common Murre and Thick Billed Murre) - *Uria lomvia*

Phalaropes (To include: Red Phalaropes Red-necked Phalaropes) Nimishuruk – *Phalaropus*

Puffin (To include: Horned Puffin and Tufted Puffin) – *Fratercula*

Snipe - *Gallinago gallinago*

Swan (To include: Trumpeter Swan, Tundra Swan and Whooper Swan) – *Cygnus*

Grouse

- Blue Grouse, Hooters – *Dendragapus obscurus*
- Spruce Grouse, Spruce Hen and Spruce Chicken – *Falcipennis canadensis*
- Ruffed Grouse – *Bonasa unbellus*
- Sharp Tailed Grouse – *Tympanuchus phasianellus*

6.5.2 GENERAL ASSUMPTIONS

- Duck, goose, ptarmigan, loon, tern, gull, murre, phalaropes, puffin, swan and grouse will each be considered a food item (respectively). Specific species of these birds (such as trumpeter swan) will not be considered separately as there is inadequate information to define these foods at this level of specificity.

- It is assumed that three main parts will be eaten from the fowl, the flesh/meat, the liver, and the heart. Fowl with harvest and consumption estimates too small to allow this division will be considered a food unto themselves. All fowl is assumed to be eaten in the cooked form as there was no evidence to the contrary.

6.5.3 PORTION SIZE ASSUMPTIONS

- Portion size data are derived from the assessments done by CINE about Inuit dietary practices. Specific information on portion sizes consumed by Alaskans is lacking, so Canadian data are used as proxies. For each age group a median portion size is listed. This will be used as a point estimate for each age and gender group. When no information regarding portion size is available, a proxy number will be used (proxy numbers can be identified by cells which have a number of respondents of zero). Proxy numbers are referenced to their source in a note within the cells of the excel worksheet and can be located on the excel "Fowl Summary Spreadsheet" found in Appendix I.

- An average portion size is assigned for the purposes of determining the number of eating events. A weighted average is calculated from the given median portion sizes to get an average portion size estimate. This is indicated in the top portion of each spreadsheet.

- It is assumed that portion sizes will remain consistent throughout the year. While this assumption is probably not accurate, it is the best assumption available given that there is no information to quantitatively describe how portion sizes might fluctuate during the year. It is likely that when fresh fowl is available or fewer other resources are available, larger portions are eaten, but at this time no data are available to define the magnitude of this change.

- Since there is no information regarding portion sizes in children, the portion sizes for children are handled using a scale that was developed based upon the Institute of Medicine, Dietary Reference Intakes. This scale uses estimated energy needs to determine what percent of an adult's portion size will be assigned to children of different age groups. For example, estimated energy needs for a female child age 2-3 are 50% of the estimated energy needs of a female adult 20-40. In this case, a portion size for an adult female age 20-40 would be reduced by ½ for a child in this age group. A factor was calculated for each age group and applied to the mean as well as the standard deviation to calculate portion size distributions or

point estimates for children based upon an adult reference group. The factors used are listed in Appendix G.

- The age groups according to the IOM do not correlate exactly with the age groups in the Dietary Record Generator™ (DRG). The factor calculated for children age 2-3 based on IOM recommendations is applied to children age 1-2 in the DRG, the factor for children age 4-8 based on IOM recommendations is applied to children age 3-5 in the DRG, the factor for children age 9-13 based on IOM recommendations is applied to children age 6-12 in the DRG, and the factor for children age 14-18 based on IOM recommendations is applied to children age 13-19 in the DRG.

6.5.4 PROBABILITY OF EATING ASSUMPTIONS

- Each region and season shows a single calculated probability of eating for a given food which will be applied to all age groups. It is likely that younger generations eat fewer of some subsistence foods than do the older generations as market foods become more available. However, there is no quantitative data to inform how age affects probability of eating. In the interest of being conservative, it will be assumed that the probability of eating will apply to all age groups.

- Harvest estimates from the Community Subsistence Information System are calculated as pounds of resource per user per year. The "user" is defined as a person within a family unit which reports that they used the resource. The family does not have to have hunted or gathered the resource to report that they use the resource. This is important because it is well documented that in some cases the number of people hunting/gathering a resource is much smaller than those who use it. The distribution network of traditional foods is extensive in most locations. Households surveyed by ADFG who report using a resource are multiplied by the average number of people in a household for that specific community and this number is the "denominator" or the number of users in the community.

- "Users" of resources are not necessarily only Alaska Natives but rather are residents of Alaska who harvest under subsistence regulations. In rural communities (subsistence harvest areas), a larger percentage of the population is likely to be Alaska Native than in urban centers. In most rural regions, the harvest data may be fairly representative of intake in Alaska Native populations, as the number of non-native residents using traditional resources will be small. However, Native and non-native "users" are likely to use resources differently from one another.

- The average total pounds consumed per user per year from the Alaska Traditional Diet Survey are calculated and it is assumed that these numbers do not need to be adjusted for cooking losses. In all cases, just the type of fowl is reported without any further detail as to what preparation method or part is being eaten. For some fowl (with large enough estimates to have significant probabilities) the fowl is divided into the flesh/meat, heart, and liver. For others with very small amounts reported, only the species of fowl was used. All documentation indicated that fowl meat is usually eaten boiled, fried, or baked and in a survey by ADFG it was indicated that the heart and liver were eaten by about 5-20% of the population surveyed.

- It is difficult to determine how areas surveyed by the ATDP should be applied to the Ecological-Cultural Zones. The areas surveyed by the ATDP do not exactly fit the Zones used in the creation of the Alaska Compendium of Dietary Files. Recognizing that these estimates are not specific for the Zones, the Subarctic Interior Zone is assigned an average consumption from the Tanana Chiefs Conference (TCC) and the Yukon Kuskokwim Health Corporation (YKHC); the Arctic/Subarctic Coastal Zone is assigned an average consumption from the Yukon-Kuskokwim Health Corporation (YKHC), Bristol Bay Area Health Corporation (BBAHC), and Norton Sound Health Corporation (NSHC); the South East Zone is assigned estimates from the Southeast Alaska Regional Health Consortium (SEARHC); and the Aleutian Pacific Zone is assigned an average

from the Bristol Bay Area Health Corporation (BBAHC) and the Southeast Alaska Regional Health Consortium (SEARHC).

- When mean estimates from the ATDP are averaged to better fit the zones used in the Alaska Compendium of Dietary Files, the highest maximum value is preserved (not averaged with other maximum estimates) in order that the high end consumer is represented in the files.

- Depending on the resource under consideration, CSIS numbers may be a more specific estimate of consumption of the resource in a given zone due to the manipulation of the estimates from the ATDP. This is probably the case in zones where the estimates from different ATDP regions were very different. The average may not be an accurate representation of the true consumption in the zone. Estimates from the ATDP may be more accurate estimates of consumption given that it measures consumption and not harvest as a proxy. This is probably true in instances where the species is used for more than just human food (dog food, Native crafts, etc) causing the harvest number to overestimate the true consumption. Given the manipulation necessary for both sets of data, it is important to compare estimates from both sources and to note that often they fall very close to one another. Where this is the case, a fair degree of certainty can be given to the estimate. When the estimates are very divergent, more data is necessary.

- In ideal situations, a distribution would be available for probability of eating. When this is not available the ranges between ATDP mean, ATDP max, and CSIS estimates are used in place of a distribution or point estimate. The lowest and highest estimates are used as the end points of the range. These numbers are estimates carrying no information related to the spread or centrality of these numbers and should be interpreted with caution.

6.5.5 PROBABILITY OF EATING CALCULATIONS

- The calculation begins with average (from CSIS or ATDP) or maximum (from ATDP) total pounds of the specific resource per person (user) per year.

- Pounds per user per year are converted into number of eating events per year using the following equation. Pounds of resource X 454 g / average serving size (g).

- The calculated number of eating events is then subdivided into seasons based upon what is known about harvest patterns and seasonality of eating the resource. Most birds are eaten in the spring and fall during their migration.

- The number of eating events in each season is divided by 91 (91 days assumed in each season) to get the probability of eating on any one day.

- When a mean and maximum probability of eating is available, Crystal Ball™ software is used to convert these means and maximums into lognormal distributions. When this is not possible, triangular distributions, ranges or point estimates are used as the estimate for probability of eating.

- Specific information on how the use of fowl differs between region and season, please see the "Fowl summary spreadsheet" which contains specific information on where proxy information was used, what percentages were used and reference information.

6.5.6 REFERENCES

Kuhnlein, H., Receveur, O., Chan, H. and Loring, E. (2000). *Assessment of Dietary Benefit/Risk in Inuit Communities.* Centre for Indigenous Peoples' Nutrition and Environment, Macdonald Campus of McGill University.

The Institute of Medicine and the Food and Nutrition Board. (2005). *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids (Macronutrients).* The National Academies Press, Washington, D.C.

Alaska Department of Fish and Game, Community Subsistence Information System. (2006). Harvest per user calculated by special request for The Tribal Lifeline™ Project. Anchorage, AK.

Ballew, C., Ross, A., Wells, R., Hiratsuka, V., et al. (2004) *Final Report on the Alaska Traditional Diet Survey*, Alaska Native Epidemiology Center, Alaska Native Health Board. Retrieved from http://24.237.7.166/epicenter/pdf/traditional_diet.pdf.

Alaska Department of Fish and Game, Division of Subsistence, United States Government. Anchorage, AK. Subsistence Technical Paper Series. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Alaska Department of Fish and Game. Wildlife Notebook. Division of Subsistence. Juneau, AK. Retrieved from http://www.adfg.state.ak.us/pubs/notebook/notehome.php

Cattlemen's Beef Board and National Cattlemen's Beef Association. (2006). *How Much To Buy*. Retrieved from http://www.beefitswhatsfordinner.com/aboutbeef/pdf/HowMuchToBuyTable.pdf

Georgette, S. (2000). *Subsistence Use of Birds in the Northwest Arctic Region, Alaska. Technical Paper 260.* Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Paige, A., C. Scott, D. Andersen, S. Georgette and R. Wolfe. (1996). Subsistence Use of Birds In the Bering Strait Region, Alaska. Technical Paper 239. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from |http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Wolfe, R., A. Paige and C. Scott. (1990). *The Subsistence Harvest of Migratory Birds in Alaska. Technical Paper 197.* Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Conger, A. and J. Magdanz. (1990). The Harvest of Fish and Wildlife in Three Alaska Communities: Brevig Mission, Golovin, and Shishmaref. Technical Paper 188. Division of Subsistence, Alaska Department of Fish and Game. Anchorage, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Seitz, J. (1996). *Subsistence Uses in Clark's Point, 1990. Technical Paper 186.* Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK.

Retrieved from
http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Denlinger, L. and K. Wohl eds. (2001). *Seabird Harvest Regimes in the Circumpolar Nations. CAFF Technical Report No. 9*. Circumpolar Seabird Working Group (CSWG). Retrieved from http://www.caff.is/sidur/uploads/CAFF%20Seabird%20Harvest%20Final%205-01-SB.pdf

Wentworth, C. (2004). *Subsistence Migratory Bird Harvest Surveys Yukon-Kuskokwim Delta, 1993-2002 Bristol Bay, 1995-2001*. Alaska Migratory Bird Co-Management Council, U.S Fish and Wildlife Service. Anchorage, AK. Retrieved from http://alaska.fws.gov/ambcc/ambcc/Harvest/ykdbristol0102hs%20-%20w%20tables.pdf

Cornell University, Ornithology Lab. (2003). *All About Birds, Bird Guide*. Retrieved from http://www.birds.cornell.edu/AllAboutBirds/BirdGuide/

6.6 Documentation Specific to Salmon

6.6.1 TYPES OF SALMON INCLUDED IN THE FOOD LIST

- King Salmon, Chinook Salmon - oncorhynchus tshawytscha
- Coho Salmon, Silver Salmon - oncorhynchus kisutch
- Red Salmon, Sockeye Salmon, Blueback Salmon - oncorhynchus nerka
- Chum Salmon, Dog Salmon - oncorhynchus keta
- Pink Salmon, Humpback Salmon - oncohynchus gorbuscha

6.6.2 GENERAL ASSUMPTIONS

- Salmon is divided into its component species as there is adequate information to describe the consumption of each species and part/preparation method individually.

- Salmon is a principle resource among Alaska Native populations and should be considered as a staple food.

6.6.3 PORTION SIZE ASSUMPTIONS

- Portion size data are derived from the assessments done by CINE about Yukon First Nations dietary practices (Receveur, O., et al. 1998). Specific information

on portion sizes consumed by Alaskans is lacking, so Canadian data are used as proxies. For each age group a mean portion size, standard deviation, and number of respondents are listed on the spreadsheets when this information is available and will be used to inform a distribution. When only point estimates are available, they will be used in place of a distribution (point estimates can be identified by cells which have a number of respondents of one).

- When no information regarding portion size is available, a proxy number will be used (proxy numbers can be identified in the spreadsheets by cells having a number of respondents of zero and they are referenced to their source by a note within the cell). The "Salmon Summary Spreadsheet", found in Appendix H, also identifies the source of the proxy information.

- An average portion size is assigned for the purposes of determining the number of eating events. The portion size for fish and dry fish was given in Receveur's text (1998, pg 19) and an average of the estimates for men and women was used. When estimates specific to salmon are available, a weighted average is calculated and used as the average portion size. The average portion size is indicated in the top portion of each spreadsheet and on the "Salmon Summary Spreadsheet."

- Portion sizes are assumed to be consistent across types of salmon.

- It is assumed that portion sizes will remain consistent throughout the year. While this assumption is probably not fully accurate, it is the best assumption that is available given that there is no information to quantitatively describe how portion sizes fluctuate during the year. It is likely that when fresh salmon is available, larger portions are eaten, but at this time no data are available to define the magnitude of this change.

- Since there is no information regarding portion sizes in children, portion sizes for children are handled using a scale that was developed based upon the Institute of Medicine, Dietary Reference Intakes. This scale uses estimated energy needs to determine what percent of an adult's portion size will be assigned to children of

different age groups. For example, estimated energy needs for a female child age 2-3 are 50% of the estimated energy needs of a female adult 20-40. In this case, a portion size for an adult female age 20-40 would be reduced by one-half for a child in this age group. A factor was calculated for each age group and applied to the mean as well as the standard deviation to calculate portion size distributions or point estimates for children based upon an adult reference group. The factors used are listed in Appendix G.

- The age groups according to the IOM do not correlate exactly with the age groups in the Dietary Record Generator™ (DRG). The factor calculated for children age 2-3 based on IOM recommendations is applied to children age 1-2 in the DRG, the factor for children age 4-8 based on IOM recommendations is applied to children age 3-5 in the DRG, the factor for children age 9-13 based on IOM recommendations is applied to children age 6-12 in the DRG, and the factor for children age 14-18 based on IOM recommendations is applied to children age 13-19 in the DRG.

6.6.4 PROBABILITY OF EATING ASSUMPTIONS

- Each region and season shows a single calculated probability of eating for a given food which will be applied to all age groups. It is likely that younger generations eat fewer of some subsistence foods than do the older generations as market foods become more available. However, there is no quantitative data to inform how age affects probability of eating. In the interest of being conservative, it will be assumed that the probability of eating will apply to all age groups.

- Harvest estimates from the Community Subsistence Information System are calculated as pounds of resource per user per year. The "user" is defined as a person within a family unit which reports that they used the resource. The family does not have to have hunted or gathered the resource to report that they use the resource. This is important because it is well documented that in some cases the number of people hunting/gathering a resource is much smaller than those who use it. The distribution network of traditional foods is extensive in most

locations. Households surveyed by ADFG who report using a resource are multiplied by the average number of people in a household for that specific community and this number is the "denominator" or the number of users in the community.

- "Users" of resources are not necessarily only Alaska Natives but rather are residents of Alaska who harvest under subsistence regulations. In rural communities, a larger percentage of the population is likely to be Alaska Native than in urban centers. In most rural regions, the harvest data may be fairly representative of intake in Alaska Native populations, as the number of non-native residents using traditional resources will be small. However, in urban centers, the mix of Native and non-native people is much more significant and therefore the harvest number will represent this mix of users. Native and non-native "users" are likely to use resources differently from one another. Urban and rural Alaska Native users may also use resources differently. This affect may be fairly substantial when considering the use of salmon which is widely used by both Alaska Native and non-Alaska Native populations.

- ADFG CSIS reports the harvest of salmon as raw dressed weight. From a "western" standpoint, this may be thought of as the raw weight of fish when it comes from the grocery store. This harvest per user estimate has been adjusted for cooking/cleaning losses by applying a factor of 0.75 to the original estimate from ADFG. There is no information regarding weight loss from cooking/drying salmon. The factor of 0.75 for cooking/drying loss is an estimated factor and should in reality reflect a greater "reduction" in weight. This issue is complicated by the fact that fat content of the resource, cooking method, drying time, drying conditions, etc will all influence how much weight is lost in the process. The only reference held at present is a "yield table" from the National Cattleman's Beef Council which describes cooking losses in beef. This reference reveals a cooking yield of 28-75% depending on the type/cut of meat. In the interest of conservative estimates, the 75% yield will be used until better information can be

attained. In the case of raw or frozen salmon a cooking loss would not apply, the 0.75 factor is "undone" by applying a factor of 1.25 to CSIS harvest numbers.

- The average total pounds per user as calculated from the Alaska Traditional Diet Project are shown within the cells of the spreadsheets and include all preparation methods and parts of the resource. This may include dry, cooked, raw/frozen, salmon head/eyes/cheeks, and salmon liver. These estimates may not represent every part or preparation method possible and are therefore likely (if anything) to underestimate the actual total. However, major parts/preparation methods should be accounted for as the report included parts or preparation methods reported by greater than 50% of the population as well as resources contributing to the largest total weight consumed.

- In the CSIS, the total pounds harvested, but no parts or preparation methods are reported. In order to deal with this issue, a proxy set of percentages was used to divide up the total harvest amount into component preparation methods or parts which are based upon salmon reports from the ATDP. According to salmon data from the ATDP, cooked salmon represents 27%, dry salmon represents 52%, and raw/frozen salmon represents 21% of the total salmon consumed. It is known that salmon head and liver are also eaten and should be considered in the assessment. These percentages are adjusted to reflect this piece of information and it is assumed that fish head is 5%, and fish liver is 3% of the total harvest or consumption number. This is an estimate, based on discussions with Alaska Natives familiar with use of these resources. Results from these foods should be interpreted with this understanding. This set of percentages is applied to the harvest estimate for salmon from the CSIS.

- It is difficult to determine how areas surveyed by the ATDP should be applied to the Ecological-Cultural Zones. The areas surveyed by the ATDP do not exactly fit the Zones used in the creation of the Alaska Compendium of Dietary Files. Recognizing that these estimates are not specific for the Zones, the Subarctic Interior Zone is assigned an average consumption from the Tanana Chiefs

Conference (TCC) and the Yukon Kuskokwim Health Corporation (YKHC); the Arctic/Subarctic Coastal Zone is assigned an average consumption from the Yukon-Kuskokwim Health Corporation (YKHC), Bristol Bay Area Health Corporation (BBAHC), and Norton Sound Health Corporation (NSHC); the South East Zone is assigned estimates from the Southeast Alaska Regional Health Consortium (SEARHC); and the Aleutian Pacific Zone is assigned an average from the Bristol Bay Area Health Corporation (BBAHC) and the Southeast Alaska Regional Health Consortium (SEARHC).

- When mean estimates from the ATDP are averaged to better fit the zones used in the Alaska Compendium of Dietary Files, the highest maximum value is preserved (not averaged with other maximum estimates) in order that the high end consumer is represented in the files.

- Depending on the resource under consideration, CSIS numbers may be a more specific estimate of consumption of the resource in a given zone due to the manipulation of the estimates from the ATDP. This is probably the case in zones where the estimates from different ATDP regions were very different. The average may not be an accurate representation of the true consumption in the zone. Estimates from the ATDP may be more accurate estimates of consumption given that it measures consumption and not harvest as a proxy. This is probably true in instances where the species is used for more than just human food (dog food, Native crafts, etc) causing the harvest number to overestimate the true consumption. Given the manipulation necessary for both sets of data, it is important to compare estimates from both sources and to note that often they fall very close to one another. Where this is the case, a fair degree of certainty can be given to the estimate. When the estimates are very divergent, more data are necessary.

- In ideal situations, a distribution would be available for probability of eating. When this is not available the ranges between ATDP mean, ATDP max, and CSIS estimates will be used in place of a distribution or point estimate. The lowest and

highest estimates are used as the end points of the range. These numbers are estimates carrying no information related to the spread or centrality of these numbers and should be interpreted with caution.

6.6.5 PROBABILITY OF EATING CALCULATIONS

- The calculation begins with average (from CSIS or ATDP) or maximum (from ATDP) total pounds of the specific resource per person (user) per year.

- Pounds per user per year are converted into number of eating events per year using the following equation. Pounds of resource X 454 g / average serving size (g).

- The calculated number of eating events is then subdivided into seasons based upon what is known about harvest patterns and seasonality of eating the resource. Salmon is caught mainly in the summer and has a smaller season in the fall. The preserved forms are eaten more consistently throughout the year. The seasonality of eating the resource can be determined using the "Salmon Summary Spreadsheet."

- The number of eating events in each season is divided by 91 (91 days assumed in each season) to get the probability of eating on any one day.

- When a mean and maximum probability of eating is available, Crystal Ball™ software is used to convert these means and maximums into lognormal distributions. When this is not possible, triangular distributions, ranges or point estimates are used as the estimate for probability of eating.

- Specific information on how the use of salmon differs between region and season, please see the "Salmon summary spreadsheet" which contains specific information on where proxy information was used, what percentages were used and reference information.

6.6.6 REFERENCES

Receveur, O., Kassi, H., Chan, P., Berti, H. and Kuhnlein, H. (1998). *Yukon First Nations' Assessment of Dietary Benefit/Risk.* Centre for Indigenous Peoples' Nutrition and Environment, Macdonald Campus of McGill University.

The Institute of Medicine and the Food and Nutrition Board. (2005). *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids (Macronutrients)*. The National Academies Press, Washington, D.C.

Alaska Department of Fish and Game, Community Subsistence Information System. (2006). Harvest per user calculated by special request for The Tribal Lifeline™ Project. Anchorage, AK.

Ballew, C., Ross, A., Wells, R., Hiratsuka, V., et al. (2004) *Final Report on the Alaska Traditional Diet Survey*, Alaska Native Epidemiology Center, Alaska Native Health Board. Retrieved from http://24.237.7.166/epicenter/pdf/traditional_diet.pdf

Alaska Department of Fish and Game, Division of Subsistence, United States Government. Anchorage, AK. Subsistence Technical Paper Series. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Alaska Department of Fish and Game. *Wildlife Notebook.* Division of Subsistence. Juneau, AK. Retrieved from http://www.adfg.state.ak.us/pubs/notebook/notehome.php

Williams, L., Venechuk, C., Holen, D. and Simeone W. (2004) *Lake Minchumina, Telida, Nikolai, and Cantwell Subsistence Community Use Profiles and Traditional Fisheries Use, Technical Paper 295*. Department of Subsistence, Alaska Department of Fish and Game.

Alaska Department of Fish and Game. (2005) *Alaska Subsistence Fisheries 2003 Annual Report.* Division of Subsistence. Juneau, AK.

Stickman, K., Balluta, A., McBurney, M. and Young, D. (2003). *K'ezghlegh Nondalton Traditional Ecological Knowledge of Freshwater Fish. U. S. Fish and Wildlife Service of Subsistence Management, Fisheries Resource Monitoring Program, Final Report* (Study No. 01-075). Nondalton Tribal Council, Alaska.

Cattlemen's Beef Board and National Cattlemen's Beef Association. (2006). *How Much To Buy*. Retrieved from http://www.beefitswhatsfordinner.com/aboutbeef/pdf/HowMuchToBuyTable.pdf

6.7 Documentation Specific to Vegetation

6.7.1 TYPES OF VEGETATION INCLUDED IN THE FOOD LIST

- Fiddlehead Ferns – *Dryopteris austriaca* – Spreading Wood Fern, Fiddlenecks – *Dryopteris austriaca*
- Beach Greens – Seabeach Sandwort, Seapurslane, Sea-chickweed, Ahsahklook (name used on Seward Peninsula), Eteeahahluk (name used in Bristol Bay) – *Honckenya peploides*
- Sourdock, Wild Spinach, Arctic Dock, Ahlooieguk, Ahlooieruk, Kuagtsik (Eskimo) – *Rumex articus*
- Wild celery, Seacoast Angelica, Ahzeeahlook (name used in Shishmaref), Egoosuk (name used in Kotzebue), Sea Lovage, Tuguyuk (name used in Bristol Bay), Cheecheekok (name used in Nome), Cowparsnip – *Liguisticum, Angelica Lucida and Heracleum Lanatum*
- "Other" vegetation
- "Plants, greens, and mushrooms"
- Seaweed/Kelp
- - Black Seaweed, Laver, Thalkush (Tlingit) - *Porphyra lacinlata*
- - Bull Kelp - *Nereocystis luetkeana*
- - Giant Kelp - *Macrocystis pyrifera*
- - Other Seaweed/Kelp
- Sea asparagus, Beach Aspargus, Glasswort - *Salicornia pacifica Standley*
- Roots – may be comprised of the following roots which are eaten in Alaska: Bering Sea Spring Beauty, Potato Plant, Black Lily, Eskimo Potato, Yellow Pond Lily, Parry's Wallflower, Wooly Lousewort, Pink Plumes, Wild Sweet Potato, or Roseroot.
- Wild Onions, Wild Chives, Teeveeteeuk (name used in Teller), Pahteetock (name used in Norvik) – *Allium schoenoprasum*

6.7.2 TYPES OF PLANTS USED FOR TEA OR FOR CHEWING INCLUDED IN THE FOOD LIST

Stinkweed, Wormwood, Sagewort - *Artemisia tilesii*

Tundra Tea, Spruce Needle Tea, Spruce Bark Tea, Labrador Tea - *Picea mariana and Ledum palustre*

6.7.3 GENERAL ASSUMPTIONS

- Vegetation will be considered based upon its separate types of vegetation listed above. Seaweed will be considered based on the four specific types described above.

- The CSIS survey includes information regarding "vegetation" and "plants, greens, mushrooms" as two separate entries into the database. It is not clear whether these are two distinct categories or whether they include some of the same plants. While they may be redundant, it is decided to err on the side of inclusion and preserve them as two separate entries for the purpose of this project. Unfortunately no further clarity can be offered on what is meant by these two entries.

- It is known that vegetation is eaten in the raw and cooked forms. Often it is frozen for use later or preserved by canning or through preservation in seal oil. Seaweed may be dried. Information quantifying preparation methods used is not available and the user of the information should consider this as the results from the Compendium are interpreted.

- This list of vegetation is not exhaustive but it includes the foods reported to be eaten by more than 50% of the population surveyed in ATDP or vegetation which was asked about in CSIS surveys. It is known that there are a wide variety of plants which are eaten but that are not included in this list because there are no data to inform how much might be eaten. The category of "Other vegetation" and "Plants, greens, mushrooms" will be assumed to be a catch-all for these many other types of vegetation which are eaten. Information from the Alaska Cooperative Extension suggests that Kamchatka rockcress, wintercress, cowslip, lambsquarters, strawberry spinach, scurvygrass, sourgrass, coltsfoot, seashore plantain, wild rhubarb, pink plumes, brake, Pallas buttercup, willow leaves, spiked saxifrage, wild cucumber, dandelion, nettle, tall cottongrass, dulse, water sedge, hemlock and cattails are eaten and might be important when considering a complete diet. It is likely that these types of vegetation are generally eaten in

small amounts or by few people, however, it is suggested that further information be collected regarding these resources.

6.7.4 PORTION SIZE ASSUMPTIONS

- Portion size data are derived from the assessments done by CINE about Inuit dietary practices or are inferred based upon knowledge of how the resources are used (e.g., teas). Specific information on portion sizes consumed by Alaskans is lacking, so Canadian data are used as proxies. For each age group a mean portion size and N are listed on the spreadsheets. Only one point estimate is available from data from the Inuit studies, so this point estimate will be used as a proxy estimate for most types of vegetation. The "Vegetation Summary Spreadsheet", found in Appendix H, also identifies the source of the proxy information.

- An average portion size is assigned for the purposes of determining the number of eating events. Estimates specific to the type of vegetation are used to calculate a weighted average for use as the average portion size. The average portion size is indicated in the top portion of each spreadsheet and on the "Vegetation Summary Spreadsheet."

- In cases where nineteen year olds are not accounted for in the data from Receveur et al., they will be grouped into the portion size groups with adults, 20-40y.

- It is assumed that portion sizes will remain consistent throughout the year. While this assumption is probably not fully accurate, it is the best assumption that is available given that there is no information to quantitatively describe how portion sizes fluctuate during the year. It is likely that when fresh vegetation is available, larger portions are eaten, but at this time no data are available to define the magnitude of this change.

- Since there is no information regarding portion sizes in children, portion sizes for children are handled using a scale that was developed based upon the Institute of Medicine, Dietary Reference Intakes. This scale uses estimated energy needs to determine what percent of an adult's portion size will be assigned to children of

different age groups. For example, estimated energy needs for a female child age 2-3 are 50% of the estimated energy needs of a female adult 20-40. In this case, a portion size for an adult female age 20-40 would be reduced by ½ for a child in this age group. A factor was calculated for each age group and applied to the mean as well as the standard deviation to calculate portion size distributions or point estimates for children based upon an adult reference group. The factors used are listed in Appendix G.

- The age groups according to the IOM do not correlate exactly with the age groups in the Dietary Record Generator™ (DRG). The factor calculated for children age 2-3 based on IOM recommendations is applied to children age 1-2 in the DRG, the factor for children age 4-8 based on IOM recommendations is applied to children age 3-5 in the DRG, the factor for children age 9-13 based on IOM recommendations is applied to children age 6-12 in the DRG, and the factor for children age 14-18 based on IOM recommendations is applied to children age 13-19 in the DRG.

6.7.5 PROBABILITY OF EATING ASSUMPTIONS

- Each region and season showsa single calculated probability of eating which will be applied to all age groups. It is likely that younger generations eat fewer of some subsistence foods than do the older generations as market foods become more available. However, there is no quantitative data to inform how age affects probability of eating. In the interest of being conservative, it will be assumed that the probability of eating will apply to all age groups.

- Harvest estimates from the Community Subsistence Information System are calculated as pounds of resource per user per year. The "user" is defined as a person within a family unit which reports that they used the resource. The family does not have to have hunted or gathered the resource to report that they use the resource. This is important because it is well documented that in some cases the number of people hunting/gathering a resource is much smaller than those who use it. The distribution network of traditional foods is extensive in most

locations. Households surveyed by ADFG who report using a resource are multiplied by the average number of people in a household for that specific community and this number is the "denominator" or the number of users in the community.

- "Users" of resources are not necessarily only Alaska Natives but rather are residents of Alaska who harvest under subsistence regulations. In rural communities, a larger percentage of the population is likely to be Alaska Native than in urban centers. In most rural regions, the harvest data may be fairly representative of intake in Alaska Native populations, as the number of non-native residents using traditional resources will be small. However, in urban centers, the mix of Native and non-native people is much more significant and therefore the harvest number will represent this mix of users. Native and non-native "users" are likely to use resources differently from one another. Urban and rural Alaska Native users may also use resources differently. This affect may be fairly substantial when considering the use of vegetation which in some cases is widely used by both Alaska Native and non-Alaska Native populations.

- ADFG CSIS reports the harvest of vegetation as raw weight. While most other resources have been adjusted for cooking losses, the raw weight of vegetation will be used. There is no information to tell how much of the vegetation is eaten raw, how much is cooked, canned, dried, or preserved using marine mammal oils.

- ADFG CSIS also reports the total weight of vegetation harvested without respect to type of vegetation in all zones except for the Arctic Subarctic Coast. In the case of the Arctic Subarctic Coast, numbers from CSIS are used relevant to the types of vegetation. In all other regions the total amount of vegetation reported to be harvested is reported as "Other vegetation" and "Plants, greens, mushrooms" and will be reflected as such in the files. Please note that while the entries for specific vegetation reflects a zero probability of eating, that is related only to the fact that no consumption or harvest data is available for these specific resources.

They very well may be consumed and included in the survey results for "Other vegetation" or "Plants, greens, mushrooms."

- It is difficult to determine how areas surveyed by the ATDP should be applied to the Ecological-Cultural Zones. The areas surveyed by the ATDP do not exactly fit the Zones used in the creation of the Alaska Compendium of Dietary Files. Recognizing that these estimates are not specific for the Zones, the Subarctic Interior Zone is assigned an average consumption from the Tanana Chiefs Conference (TCC) and the Yukon Kuskokwim Health Corporation (YKHC); the Arctic/Subarctic Coastal Zone is assigned an average consumption from the Yukon-Kuskokwim Health Corporation (YKHC), Bristol Bay Area Health Corporation (BBAHC), and Norton Sound Health Corporation (NSHC); the South East Zone is assigned estimates from the Southeast Alaska Regional Health Consortium (SEARHC); and the Aleutian Pacific Zone is assigned an average from the Bristol Bay Area Health Corporation (BBAHC) and the Southeast Alaska Regional Health Consortium (SEARHC).

- When mean estimates from the ATDP are averaged to better fit the zones used in the Alaska Compendium of Dietary Files, the highest maximum value is preserved (not averaged with other maximum estimates) in order that the high end consumer is represented in the files.

- Depending on the resource under consideration, CSIS numbers may be a more specific estimate of consumption of the resource in a given zone due to the manipulation of the estimates from the ATDP. This is probably the case in zones where the estimates from different ATDP regions were very different. The average may not be an accurate representation of the true consumption in the zone. Estimates from the ATDP may be more accurate estimates of consumption given that it measures consumption and not harvest as a proxy. This is probably true in instances where the resource is used for more than just human food (dog food, Native crafts, etc) causing the harvest number to overestimate the true consumption. Given the manipulation necessary for both sets of data, it is

important to compare estimates from both sources and to note that often they fall very close to one another. Where this is the case, a fair degree of certainty can be given to the estimate. When the estimates are very divergent, more data is necessary.

- In ideal situations, a distribution would be available for probability of eating. When this is not available the ranges between ATDP mean, ATDP max, and CSIS estimates will be used in place of a distribution or point estimate. The lowest and highest estimates are used as the end points of the range. These numbers are estimates carrying no information related to the spread or centrality of these numbers and should be interpreted with caution.

6.7.6 PROBABILITY OF EATING CALCULATIONS

- The calculation begins with average (from CSIS or ATDP) or maximum (from ATDP) total pounds of the specific resource per person (user) per year.

- Pounds per user per year are converted into number of eating events per year using the following equation. Pounds of resource X 454 g / average serving size (g).

- The calculated number of eating events is then subdivided into seasons based upon what is known about harvest patterns and seasonality of eating the resource. Vegetation varies widely in its availability and use but are usually consumed in the spring, summer and fall when it is available. The seasonality of eating the resource can be determined using the "Vegetation Summary Spreadsheet."

- The number of eating events in each season is divided by 91 (91 days assumed in each season) to get the probability of eating on any one day.

- When a mean and maximum probability of eating is available, Crystal Ball™ software is used to convert these means and maximums into lognormal distributions. When this is not possible, triangular distributions, ranges or point estimates are used as the estimate for probability of eating.

- Specific information on how the use of vegetation differs between region and season, please see the "Vegetation Summary Spreadsheet" which contains specific information on where proxy information was used, what percentages were used, and reference information.

6.7.7 REFERENCES

Kuhnlein, H., Receveur, O., Chan, H. and Loring, E. (2000). *Assessment of Dietary Benefit/Risk in Inuit Communities*. Centre for Indigenous Peoples' Nutrition and Environment, Macdonald Campus of McGill University.

The Institute of Medicine and the Food and Nutrition Board. (2005). *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein and Amino Acids (Macronutrients)*. The National Academies Press, Washington, D.C.

Alaska Department of Fish and Game, Community Subsistence Information System. (2006). Harvest per user calculated by special request for The Tribal Lifeline™ Project. Anchorage, AK.

Ballew, C., Ross, A., Wells, R., Hiratsuka, V., et al. (2004) *Final Report on the Alaska Traditional Diet Survey*, Alaska Native Epidemiology Center, Alaska Native Health Board. Retrieved from http://24.237.7.166/epicenter/pdf/traditional_diet.pdf

Alaska Department of Fish and Game, Division of Subsistence, United States Government. Anchorage, AK. Subsistence Technical Paper Series. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

University of Alaska Fairbanks Cooperative Extension. (1993). *Wild Edible and Poisonous Plants of Alaska*. University of Alaska Fairbanks, Fairbanks, AK.

Northern Adventures Publications. (1996). *Wild Alaskan Recipes and Hints*. Northern Adventure Publications, Wasilla, AK.

Miller, F. (2002). *Recipe Reminders forStinkweed*. Kaìiqsirugut News, Norton Sound Health Corporation. Nome, AK. Retrieved from http://www.nortonsoundhealth.org/kaniqsirugut/k49/page20.pdf

Seitz, J. (1996). *Subsistence Uses in Clark's Point, 1990. Technical paper 186.* Subsistence Technical Paper Series. Alaska Department of Fish and Game, Division of Subsistence. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Gmelch, G., Gmelch, S. and Nelson, R. (1983). *Sitka: Resource Use in a Small Alaskan City*. Technical Paper 90. Subsistence Technical Paper Series. Alaska Department of Fish and Game, Division of Subsistence. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Viereck, E. (1995). *Alaska's Wilderness Medicines, Healthful Plants of the Far North*. Alaska Northwest Books, Anchorage AK. Retrieved from http://www.ankn.uaf.edu/Curriculum/Books/Viereck/index.html

6.8 Documentation Specific to Game Mammals

6.8.1 TYPES OF GAME MAMMALS INCLUDED IN THE FOOD LIST

Caribou - *Rangifer tarandus granti*

Bear
- Black Bear – *Ursus americanus*
- Brown Bear – *Ursus arctos*
- Polar Bear – *Ursus maritimus*

Sitka Black-tailed Deer – Odocoileus hemionus sitkensis
Moose – Alces alces gigas
Muskox – Ovibos moschatus
Muskrat – Ondatra zibethicus

Rabbit, Hare
- - Snowshoe Hare – Lepus americanus
- - Alaskan Hare – Lepus othus

Squirrel
- Red Squirrel – *Tamiasciurus hudsonicus*
- Arctic Ground Squirrel, Parka Squirrel – *Spermophilus parryii*

Lynx – Lynx canadensis
Porcupine – Erethizon dorsatum
Dall Sheep – Ovis dalli dalli
Marmot, Groundhog
- - Hoary Marmot – Marmota caligata
- - Alaska Marmot – Marmota broweri
- - Woodchuck – Marmota monax

American Bison – Bison bison
Mountain Goat – Oreamnos americanus
River Otter – Lutra canadensis

6.8.2 GENERAL ASSUMPTIONS

- Marmot and rabbits will be considered a food item without any more specificity to the type of marmot or rabbit being eaten. Specific species of marmot or rabbit will not be considered separately as there is inadequate information to define them at this level of specificity. The species of bears (black, brown and polar) and squirrels (red and ground) will each be considered a specific food.

- Reindeer is the domesticated form of caribou and for the purposes of this project will be considered the same food as caribou. There were no specific estimates for reindeer used during the construction of the Compendium.

- Moose, caribou, deer and bear are divided into specific parts and preparation methods in the food list for the Compendium of Traditional Alaskan Diets. The remaining species do not include an attempt to detail preparation methods or parts used as this information is not available and there were no proxy estimates which were felt to be applicable. Users of the Compendium should interpret results with this understanding.

6.8.3 PORTION SIZE ASSUMPTIONS

- Portion size data are derived from the assessments done by CINE about Yukon First Nations, Inuit, and Dene Metis dietary practices. Specific information on portion sizes consumed by Alaskans is lacking, so Canadian data are used as proxies. For each age group a mean portion size, standard deviation, and number of respondents are listed on the spreadsheets when this information is available and will be used to inform a distribution. When only point estimates are available, they will be used in place of a distribution (point estimates can be identified by cells which have an number of respondents of one).

- When no information regarding portion size is available, a proxy number will be used (proxy numbers can be identified in the spreadsheets by cells having a number of respondents of zero and they are referenced to their source by a note

within the cell). The "Game Mammal Summary Spreadsheet", found in Appendix H, also identifies the source of the proxy information.

- An average portion size is assigned for the purposes of determining the number of eating events. The portion size for meat and dry meat was given in Receveur's text (1998, pg 19) and an average of the estimates for men and women was used. When estimates specific to the type/preparation method of game mammal are available, a weighted average is calculated and used as the average portion size. The average portion size is indicated in the top portion of each spreadsheet and on the "Game Mammal Summary Spreadsheet."

- In cases where nineteen year olds are not accounted for in the data from Receveur et al., they will be grouped into the portion size groups with adults, 20-40y. In some cases portion size estimates do include 19 year olds and this information will then be used.

- It is assumed that portion sizes will remain consistent throughout the year. While this assumption is probably not fully accurate, it is the best assumption that is available given that there is no information to quantitatively describe how portion sizes fluctuate during the year. It is likely that when fresh game is available, larger portions are eaten, but at this time no data are available to define the magnitude of this change.

- Since there is no information regarding portion sizes in children, portion sizes for children are handled using a scale that was developed based upon the Institute of Medicine, Dietary Reference Intakes. This scale uses estimated energy needs to determine what percent of an adult's portion size will be assigned to children of different age groups. For example, estimated energy needs for a female child age 2-3 are 50% of the estimated energy needs of a female adult 20-40. In this case, a portion size for an adult female age 20-40 would be reduced by ½ for a child in this age group. A factor was calculated for each age group and applied to the mean as well as the standard deviation to calculate portion size distributions or

point estimates for children based upon an adult reference group. The factors used are listed in Appendix G.

- The age groups according to the IOM do not correlate exactly with the age groups in the Dietary Record Generator™ (DRG). The factor calculated for children age 2-3 based on IOM recommendations is applied to children age 1-2 in the DRG, the factor for children age 4-8 based on IOM recommendations is applied to children age 3-5 in the DRG, the factor for children age 9-13 based on IOM recommendations is applied to children age 6-12 in the DRG, and the factor for children age 14-18 based on IOM recommendations is applied to children age 13-19 in the DRG.

6.8.4 PROBABILITY OF EATING ASSUMPTIONS

- Each region and season shows a single calculated probability of eating for a given food which will be applied to all age groups. It is likely that younger generations eat fewer of some subsistence foods than do the older generations as market foods become more available. However, there are no quantitative data to inform how age affects probability of eating. In the interest of being conservative, it will be assumed that the probability of eating will apply to all age groups.

- Harvest estimates from the Community Subsistence Information System are calculated as pounds of resource per user per year. The "user" is defined as a person within a family unit which reports that they used the resource. The family does not have to have hunted or gathered the resource to report that they use the resource. This is important because it is well documented that in some cases the number of people hunting/gathering a resource is much smaller than those who use it. The distribution network of traditional foods is extensive in most locations. Households surveyed by ADFG who report using a resource are multiplied by the average number of people in a household for that specific community and this number is the "denominator" or the number of users in the community.

- "Users" of resources are not necessarily only Alaska Natives but rather are residents of Alaska who harvest under subsistence regulations. In rural communities, a larger percentage of the population is likely to be Alaska Native than in urban centers. In most rural regions, the harvest data may be fairly representative of intake in Alaska Native populations, as the number of non-native residents using traditional resources will be small. However, in urban centers, the mix of Native and non-native people is much more significant and therefore the harvest number will represent this mix of users. Native and non-native "users" are likely to use resources differently from one another. Urban and rural Alaska Native users may also use resources differently. This affect may be fairly substantial when considering the use of some game which is widely used by both Alaska Native and non-Alaska Native populations.

- ADFG CSIS reports the harvest of game as raw dressed weight. From a "western" standpoint, this may be thought of as the raw weight of meat when it comes from the grocery store. This harvest per user estimate has been adjusted for cooking/cleaning losses by applying a factor of 0.75 to the original estimate from ADFG. There is no information regarding weight loss from cooking/drying game. The factor of 0.75 for cooking/drying loss is an estimated factor and should in reality reflect a greater "reduction" in weight. This issue is complicated by the fact that fat content of the resource, cooking method, drying time, drying conditions, etc will all influence how much weight is lost in the process. The only reference held at present is a "yield table" from the National Cattleman's Beef Council which describes cooking losses in beef. This reference reveals a cooking yield of 28-75% depending on the type/cut of meat. In the interest of conservative estimates, the 75% yield will be used until better information can be attained.

- The average total pounds per user as calculated from the Alaska Traditional Diet Project are shown within the cells of the spreadsheets and include all reported preparation methods and parts of the resource. In the game mammals it is assumed that this may, but does not always include dry and cooked forms as well

as any other organ eaten, such as the fat, bone marrow, intestines, liver, kidney, heart, nose, and/or tongue. Due to the possibility that this is not a complete record of all that is eaten, these estimates do not always represent every part or preparation method possible and are therefore likely to underestimate the actual total eaten. However, major parts/preparation methods should be accounted for as the report includes parts or preparation methods reported by greater than 50% of the population as well as those contributing to the largest total weight consumed.

- In many cases with the ATDP data and in all cases with the CSIS data, just the type of game is reported without any further detail as to what preparation method or parts are being eaten. A proxy set of percentages were developed based upon the uses of some game mammals as reported by the ATDP and applied to the consumption and harvest estimates from other game mammals. For example caribou data from the ATDP describes the prep methods and parts eaten as being cooked 28%, dried 34%, marrow 9%, liver 8%, kidney 2%, heart 4%, and fat 16%. These estimates were modified slightly to include the intestine and tongue and then these estimates were applied to other species which are thought to be used in a similar fashion (for example deer).

- In some cases, dividing the game up in the manner described above proved that the resulting probability of eating became too small and insignificant. It was obvious that dividing the estimates to this degree of detail left almost all probabilities of eating any one of these things at 0. In these cases, categories such as “muskox” are left intact and the user of the file must decide how to interpret this information.

- It is difficult to determine how areas surveyed by the ATDP should be applied to the Ecological-Cultural Zones. The areas surveyed by the ATDP do not exactly fit the Zones used in the creation of the Alaska Compendium of Dietary Files. Recognizing that these estimates are not specific for the Zones, the Subarctic Interior Zone is assigned an average consumption from the Tanana Chiefs Conference (TCC) and the Yukon Kuskokwim Health Corporation (YKHC); the

Arctic/Subarctic Coastal Zone is assigned an average consumption from the Yukon-Kuskokwim Health Corporation (YKHC), Bristol Bay Area Health Corporation (BBAHC), and Norton Sound Health Corporation (NSHC); the South East Zone is assigned estimates from the Southeast Alaska Regional Health Consortium (SEARHC); and the Aleutian Pacific Zone is assigned an average from the Bristol Bay Area Health Corporation (BBAHC) and the Southeast Alaska Regional Health Consortium (SEARHC).

- When mean estimates from the ATDP are averaged to better fit the zones used in the Alaska Compendium of Dietary Files, the highest maximum value is preserved (not averaged with other maximum estimates) in order that the high end consumer is represented in the files.

- Depending on the resource under consideration, CSIS numbers may be a more specific estimate of consumption of the resource in a given zone due to the manipulation of the estimates from the ATDP. This is probably the case in zones where the estimates from different ATDP regions were very different. The average may not be an accurate representation of the true consumption in the zone. Estimates from the ATDP may be more accurate estimates of consumption given that it measures consumption and not harvest as a proxy. This is probably true in instances where the species is used for more than just human food (dog food, Native crafts, etc) causing the harvest number to overestimate the true consumption. Given the manipulation necessary for both sets of data, it is important to compare estimates from both sources and to note that often they fall very close to one another. Where this is the case, a fair degree of certainty can be given to the estimate. When the estimates are very divergent, more data is necessary.

- In ideal situations, a distribution would be available for probability of eating. When this is not available the ranges between ATDP mean, ATDP max, and CSIS estimates will be used in place of a distribution or point estimate. The lowest and highest estimates are used as the end points of the range. These numbers are

estimates carrying no information related to the spread or centrality of these numbers and should be interpreted with caution.

6.8.5 PROBABILITY OF EATING CALCULATIONS

- The calculation begins with average (from CSIS or ATDP) or maximum (from ATDP) total pounds of the specific resource per person (user) per year.

- Pounds per user per year are converted into number of eating events per year using the following equation. Pounds of resource X 454 g / average serving size (g).

- The calculated number of eating events is then subdivided into seasons based upon what is known about harvest patterns and seasonality of eating the resource. Game mammals vary widely in their availability and use. The seasonality of eating the resource can be determined using the "Game Mammals Summary Spreadsheet."

- The number of eating events in each season is divided by 91 (91 days assumed in each season) to get the probability of eating on any one day.

- When a mean and maximum probability of eating is available, Crystal Ball™ software is used to convert these means and maximums into lognormal distributions. When this is not possible, triangular distributions, ranges or point estimates are used as the estimate for probability of eating.

- Specific information on how the use of game mammals differs between region and season, please see the "Game Mammals Summary Spreadsheet" which contains specific information on where proxy information was used, what percentages were used, and reference information.

6.8.6 REFERENCES

Receveur, O., Kassi, H., Chan, P., Berti, H. and Kuhnlein, H. (1998). *Yukon First Nations' Assessment of Dietary Benefit/Risk.* Centre for Indigenous Peoples' Nutrition and Environment, Macdonald Campus of McGill University.

Receveur, O., Boulay, M., Mills, C., Carpenter, W. and Kuhnlein, H. (1996). *Variance in Food Use in Dene/Metis Communities*. Centre for Indigenous Peoples' Nutrition and Environment, Macdonald Campus of McGill University.

Kuhnlein, H., Receveur, O., Chan, H. and Loring, E. (2000). *Assessment of Dietary Benefit/Risk in Inuit Communities*. Centre for Indigenous Peoples' Nutrition and Environment, Macdonald Campus of McGill University.

The Institute of Medicine and the Food and Nutrition Board. (2005). *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein and Amino Acids (Macronutrients).* The National Academies Press, Washington, D.C.

Alaska Department of Fish and Game, Community Subsistence Information System. (2006). Harvest per user calculated by special request for The Tribal Lifeline™ Project. Anchorage, AK.

Ballew, C., Ross, A., Wells, R., Hiratsuka, V., et al. (2004) *Final Report on the Alaska Traditional Diet Survey*, Alaska Native Epidemiology Center, Alaska Native Health Board. Retrieved from http://24.237.7.166/epicenter/pdf/traditional_diet.pdf

Alaska Department of Fish and Game, Division of Subsistence, United States Government. Anchorage, AK. Subsistence Technical Paper Series. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Holen, D., Simeone, W. & Williams, L. (2006). *Wild Resource Harvests and Uses by Residents of Lake Minchumina and Nikolai Alaska, 2001 - 2002*. Technical Paper 296. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Brown, C. & Koster, D. (2005). *The 2003-2004 Harvest of Moose, Caribou, Bear and Wolves in the Lower-Middle Yukon River Communities of Grayling, Anvik, Shageluk and Holy Cross. Technical Paper 298*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Holen, D., Krieg, T., Walker, R. & Nicholson, H. (2005). *Harvests and Uses of Caribou, Moose, Bears, and Dall Sheep by Communities of Game Management Units 9B and 17, Western Bristol Bay, Alaska 2001-2002. Technical Paper 283*. Division of Subsistence, Alaska Department of Fish & Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Coiley-Kenner, P., Krieg, T., Chythlook, M. and Jennings, G. (2003). *Wild Resource Harvests and Uses by Residents of Manokotak, Togiak, and Twin Hills, 1999/2000. Technical Paper 275*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Simeone, W. (2002). *Wild Resource Harvests and Uses by Residents of Cantwell, Alaska 2000. Technical Paper 272*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Magdanz, J., Utermohle, C., & Wolfe, R. (2002). *The Production and Distribution of Wild Food in Wales and Deering Alaska. Technical Paper 259*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Krieg, T., Fall, J., Utermohle, C. and Brown, L. (1998). *Subsistence Harvests and Uses of Caribou, Moose and Brown Bear in 12 Alaska Peninsula Communities, 1995/96 and 1996/97. Technical Paper 244*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Georgette, S. and Loon, H. (1993). Subsistence *Use of Fish and Wildlife in Kotzebue, A Northwest Alaska Regional Center. Technical Paper 167*. Division of Subsistence, Alaska Department of Fish and Game. Juneau. AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Pedersen, S. (1990). Caribou Hunting: Land Use Dimensions, Harvest Level and Selected Aspects of the Hunt During Regulatory Year 1987-88 in Kaktovik, Alaska. Technical Paper 172. Division of Subsistence, Alaska Department of Fish and Game. Fairbanks, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Sumida, V. & Andersen, D. (1990). *Patterns of Fish and Wildlife Use for Subsistence in Forth Yukon, Alaska. Technical Paper 179*. Division of Subsistence, Alaska Department of Fish and Game. Fairbanks, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Cohen, K., (1989). *Wrangell Harvest Study, A Comprehensive Study of Wild Resource Harvest and Use by Wrangell Residents. Technical Paper 165*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Sobelman, S. (1985). The *Economics of Wild Resource Use in Shishmaref, Alaska. Technical Report No. 112*. Division of Subsistence, Alaska Department of Fish and Game. Fairbanks, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Mills, D. and Firman, A. (1986). *Fish and Wildlife Use in Yakutat, Alaska: Contemporary Patterns and Changes. Technical Paper 131*. Division of Subsistence, Alaska Department of Fish and Game, Douglas, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Veltre, D. and Veltre, M. (1983). *Resource Utilization in Atka, Aleutian Islands, Alaska. Technical Paper Number 88*. Division of Subsistence, Alaska Department of Fish and Game. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Veltre, D. and Veltre, M. (1981). *A Preliminary Baseline Study of Subsistence Resource Utilization in the Pribilof Islands. Technical Paper Number 57*. Division of Subsistence, Alaska Department of Fish and Game. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Caulfield, R. (1983). *Subsistence Land Use in the Upper Yukon-Porcupine Region, Alaska. Technical Paper 16*. Division of Subsistence, Alaska Department of Fish and Game, Fairbanks, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm.

Kari, P. (1985). *Wild Resource Use and Economy of Stony River Village. Technical Paper 108*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Case, M. and Halpin, L. (1990). *Contemporary Wild Resource Use Patterns in Tanana, Alaska, 1987. Technical Paper 178*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Seitz, J. (1996). *Subsistence Uses in Clark's Point, 1990. Technical Paper 186*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Pedersen, S., Haynes, T., and Wolfe, R. (1991). *Historic and Current Use of Musk Ox by Kaktovik Residents. Technical Paper 206.* Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Schroeder, R. and Kookesh, M. (1990). *Subsistence Harvest and Use of Fish and Wildlife Resources and the Effects of Forest Management on Hoonah, Alaska. Technical Paper 142.* Alaska Department of Fish and Game, Division of Subsistence. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

George, G. and Bosworth, R. (1988). *Use of Fish and Wildlife by Residents of Angoon, Admirality Island, Alaska. Technical Paper 159.* Alaska Department of Fish and Game, Division of Subsistence. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Gmelch, G., Gmelch, S. and Nealson, R. (1985). *Sitka: Resource Use in a Small Alaskan City. Technical Paper 90.* Alaska Department of Fish and Game, Division of Subsistence. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

George, G. and Kookesh, M. (1983). *Angoon Deer Hunting, 1982, Technical Paper 71.* Alaska Department of Fish and Game, Division of Subsistence. Angoon, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Williams, L. (2003). *Patterns of Harvest and Use of Mountain Goats on Kodiak Island, GMU 8. Technical Paper 276.* Alaska Department of Fish and Game, Division of Subsistence. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Stanek, R. (1985). *Patterns of Resource Use in English Bay and Port Graham, Alaska. Technical Paper 104.* Alaska Department of Fish and Game, Division of Subsistence. Anchorage, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Georgette, S. and Loon, H. (1992). *Subsistence Sheep Hunting in Northwest Alaska, Technical Paper 208.* Alaska Department of Fish and Game, Division of Subsistence. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Andersen, D., Brown, L., Coffing, M., Fall, J., Jennings, G., Mishler, c., Paige, A., Utermohle, C. and Vanek, V. (1993). *Noncommercial Harvest and Uses of Wild Resources in Sand Point, Alaska, 1992. Technical Paper 226.* Alaska Department of Fish and Game, Division of Subsistence. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Alaska Department of Fish and Game. *Wildlife Notebook.* Division of Subsistence. Juneau, AK. Retrieved from http://www.adfg.state.ak.us/pubs/notebook/notehome.php

Marine Mammal Commission: *Annual Report to Congress.* (2006). Bethesda, MD. Retrieved from http://www.mmc.gov/reports/annual/pdf/2005annualreport.pdf

Marine Mammal Commission (2001). *The Marine Mammal Protection Act of 1972, as amended in 2001*. Bethesda, MD. Retrieved from http://www.mmc.gov/legislation/pdf/mmpaamended.pdf.

United States Fish and Wildlife Service (2002). *Stock Assessment Report: Polar Bear (Ursus maritimus): Chukchi/Bering Seas Stock.* Retrieved from http://alaska.fws.gov/fisheries/mmm/stock/finalpbbeaufortsea.pdf

United States Fish and Wildlife Service (2002). *Stock Assessment Report: Polar Bear (Ursus maritimus): Southern Beaufort Sea Stock.* Retrieved from http://alaska.fws.gov/fisheries/mmm/stock/finalpbcbseas.pdf

6.9 Documentation Specific to Sea Mammals

6.9.1 TYPES OF SEA MAMMALS INCLUDED IN THE FOOD LIST

Seals

- Oogruk, Mukluk, Bearded Seal – *Erignathus barbatus*
- Ringed Seal, Nnatchek (name used in Inupiak), Niknik (name used in Yupik) – *Phoca hispida*
- Harbor Seal, Hair Seal – *Phoca vitulina*
- Spotted Seal, Issuriq (name used in Central Yupik), Qazigyaq (name used on St. Lawrence Island Yupik), Qasigiaq (name used in Northern Inupiaq) – *Phoca largha*)
- Fur Seal – *Callorhinus ursinus*
- Ribbon Seal, Kukupak, Qaigullik – *Phoca Fasciata*

Walrus – *Odobenus rosmarus divergens*

Whale

- Bowhead Whale, Agviq (name used in Northern Inupiaq), Aghveq (name used in Yupik) – *Balaena mysticetus*
- Beluga, White Whale, Puugzaq (name used in Siberian Yupik), Cetuaq (name used in Central Yupik), Sisuaq – *Delphinapterus leucas*
- Gray Whale – *Eschrichtius robustus*

Steller Sea Lion, Northern Sea Lion – *Eumetopias jubatus*

6.9.2 GENERAL ASSUMPTIONS

Sea mammals will be considered based upon their separate subspecies (for example bearded seal instead of seal). When adequate information exists sea mammals are divided into component parts and preparation methods to include cooked or raw/frozen forms of flesh, and skin/fat (muktuk), as well as organ meat such as the intestine, liver, kidney, heart, and tongue in the food list for the Compendium of Traditional Alaskan Diets.

6.9.3 PORTION SIZE ASSUMPTIONS

- Portion size data are derived from the assessments done by CINE about Inuit dietary practices. Specific information on portion sizes consumed by Alaskans is lacking, so Canadian data are used as proxies. For each age group a mean portion size and number of respondents are listed on the spreadsheets. Only point estimates are available from this data source as no standard deviation is available from which to construct a distribution.

- When no information regarding portion size is available, a proxy number will be used (proxy numbers can be identified in the spreadsheets by cells having a number of respondents of zero and they are referenced to their source by a note within the cell) The “Sea Mammal Summary Spreadsheet”, found in Appendix H, also identifies the source of the proxy information.

- An average portion size is assigned for the purposes of determining the number of eating events. Estimates specific to the type or preparation method of sea mammal

are used to calculate a weighted average for use as the average portion size. The average portion size is indicated in the top portion of each spreadsheet and on the "Sea Mammal Summary Spreadsheet."

- In cases where nineteen year olds are not accounted for in the data from Receveur et al., they will be grouped into the portion size groups with adults, 20-40y. In some cases portion size estimates do include 19 year olds and this information will then be used.

- It is assumed that portion sizes will remain consistent throughout the year. While this assumption is probably not fully accurate, it is the best assumption that is available given that there is no information to quantitatively describe how portion sizes fluctuate during the year. It is likely that when fresh sea mammals (such as during whale migration when whales are harvested) are available, larger portions are eaten, but at this time no data are available to define the magnitude of this change.

- Since there is no information regarding portion sizes in children, portion sizes for children are handled using a scale that was developed based upon the Institute of Medicine, Dietary Reference Intakes. This scale uses estimated energy needs to determine what percent of an adult's portion size will be assigned to children of different age groups. For example, estimated energy needs for a female child age 2-3 are 50% of the estimated energy needs of a female adult 20-40. In this case, a portion size for an adult female age 20-40 would be reduced by ½ for a child in this age group. A factor was calculated for each age group and applied to the mean as well as the standard deviation to calculate portion size distributions or point estimates for children based upon an adult reference group. The factors used are listed in Appendix G.

- The age groups according to the IOM do not correlate exactly with the age groups in the Dietary Record Generator™ (DRG). The factor calculated for children age 2-3 based on IOM recommendations is applied to children age 1-2 in the DRG, the factor for children age 4-8 based on IOM recommendations is applied to

children age 3-5 in the DRG, the factor for children age 9-13 based on IOM recommendations is applied to children age 6-12 in the DRG, and the factor for children age 14-18 based on IOM recommendations is applied to children age 13-19 in the DRG.

6.9.4 PROBABILITY OF EATING ASSUMPTIONS

- Each region and season shows a single calculated probability of eating for a given food which will be applied to all age groups. It is likely that younger generations eat fewer of some subsistence foods than do the older generations as market foods become more available. However, there are no quantitative data to inform how age affects probability of eating. In the interest of being conservative, it will be assumed that the probability of eating will apply to all age groups.

- Harvest estimates from the Community Subsistence Information System are calculated as pounds of resource per user per year. The "user" is defined as a person within a family unit which reports that they used the resource. The family does not have to have hunted or gathered the resource to report that they use the resource. This is important because it is well documented that in some cases the number of people hunting/gathering a resource is much smaller than those who use it, especially for sea mammals which may be large and divided among the whole community. The distribution network of traditional foods is extensive in most locations. Households surveyed by ADFG who report using a resource are multiplied by the average number of people in a household for that specific community and this number is the "denominator" or the number of users in the community.

- "Users" of sea mammal resources are likely to be only Alaska Native as these animals are not permitted to be harvested by the general population hunting/fishing under subsistence permits. Alaska Natives are permitted to continue to use marine mammal resources by the Marine Mammal Protection Act. This is different from other resources such as game mammals where anyone demonstrating residence in Alaska (native or non-native) would be permitted to

harvest the resource under subsistence regulations. Therefore, these estimates of consumption should be applied to only those persons who are Alaska Native, as they are exclusively allowed to use marine mammal resources which are not available to subsistence users who are not Alaska Natives (Marine Mammal Commission, 2001).

- ADFG CSIS reports the harvest of sea mammals as raw dressed weight. From a "western" standpoint, this may be thought of as the raw weight of meat when it comes from the grocery store. This harvest per user estimate has been adjusted for cooking/cleaning losses by applying a factor of 0.75 to the original estimate from ADFG. There is no information regarding weight loss from cooking/drying sea mammals. The factor of 0.75 for cooking/drying loss is an estimated factor and should in reality reflect a greater "reduction" in weight. This issue is complicated by the fact that fat content of the resource, cooking method, drying time, drying conditions, etc will all influence how much weight is lost in the process. The only reference held at present is a "yield table" from the National Cattleman's Beef Council which describes cooking losses in beef. This reference reveals a cooking yield of 28-75% depending on the type/cut of meat. In the interest of conservative estimates, the 75% yield will be used until better information can be obtained.

- The average total pounds per user as calculated from the Alaska Traditional Diet Project are shown within the cells of the spreadsheets and include all reported preparation methods and parts of the resource. In the sea mammals it is assumed that this may, but does not always include cooked or raw/frozen forms of flesh, skin/fat (muktuk), as well as organ meat, such as the intestine, liver, kidney, heart, and tongue. Due to the possibility that this is not a complete record of all that is eaten, these estimates do not always represent every part or preparation method possible and are therefore likely to underestimate the actual total eaten. However, major parts/preparation methods should be accounted for as the report includes parts or preparation methods reported by greater than 50% of the population as well as those contributing to the largest total weight consumed.

- In many cases with the ATDP data and in all cases with the CSIS data, just the type of sea mammal is reported without any further detail as to what preparation method or parts are being eaten. A proxy set of percentages were developed based upon the uses of some sea mammals as reported by the ATDP and applied to the consumption or harvest estimates from other sea mammals. For example a proxy set of percentages based upon the average use of seals was applied to fur and ribbon seals as this specific detail was not reported for these resources. Average seal data from other seal species describes the prep methods and parts eaten as being flesh 62%, liver 25%, heart 5%, kidney 8%, and flipper 1%. These percentages could be applied to the total reported for fur and ribbon seals to gain estimates of consumption.

- In some cases, dividing the resource up in the manner described above proved that the probability of consumption estimates became too small and therefore insignificant. It was obvious that dividing the estimates to this degree of detail left almost all probabilities of eating any of these foods at zero. In these cases, categories such as "gray whale flesh" or "gray whale muktuk" remain, and the user of the file must decide how to interpret the results from this information.

- It is difficult to determine how areas surveyed by the ATDP should be applied to the Ecological-Cultural Zones. The areas surveyed by the ATDP do not exactly fit the Zones used in the creation of the Alaska Compendium of Dietary Files. Recognizing that these estimates are not specific for the Zones, the Subarctic Interior Zone is assigned an average consumption from the Tanana Chiefs Conference (TCC) and the Yukon Kuskokwim Health Corporation (YKHC); the Arctic/Subarctic Coastal Zone is assigned an average consumption from the Yukon-Kuskokwim Health Corporation (YKHC), Bristol Bay Area Health Corporation (BBAHC), and Norton Sound Health Corporation (NSHC); the South East Zone is assigned estimates from the Southeast Alaska Regional Health Consortium (SEARHC); and the Aleutian Pacific Zone is assigned an average from the Bristol Bay Area Health Corporation (BBAHC) and the Southeast Alaska Regional Health Consortium (SEARHC).

- When mean estimates from the ATDP are averaged to better fit the zones used in the Alaska Compendium of Dietary Files, the highest maximum value is preserved (not averaged with other maximum estimates) in order that the high end consumer is represented in the files.

- Depending on the resource under consideration, CSIS numbers may be a more specific estimate of consumption of the resource in a given zone due to the manipulation of the estimates from the ATDP. This is probably the case in zones where the estimates from different ATDP regions were very different. The average may not be an accurate representation of the true consumption in the zone. Estimates from the ATDP may be more accurate estimates of consumption given that it measures consumption and not harvest as a proxy. This is probably true in instances where the species is used for more than just human food (dog food, Native crafts, etc) causing the harvest number to overestimate the true consumption. Given the manipulation necessary for both sets of data, it is important to compare estimates from both sources and to note that often they fall very close to one another. Where this is the case, a fair degree of certainty can be given to the estimate. When the estimates are very divergent, more data is necessary.

- In ideal situations, a distribution would be available for probability of eating. When this is not available the ranges between ATDP mean, ATDP max, and CSIS estimates will be used in place of a distribution or point estimate. The lowest and highest estimates are used as the end points of the range. These numbers are estimates carrying no information related to the spread or centrality of these numbers and should be interpreted with caution.

6.9.5 PROBABILITY OF EATING CALCULATIONS

- The calculation begins with average (from CSIS or ATDP) or maximum (from ATDP) total pounds of the specific resource per person (user) per year.

- Pounds per user per year are converted into number of eating events per year using the following equation. Pounds of resource X 454 g / average serving size (g).

- The calculated number of eating events is then subdivided into seasons based upon what is known about harvest patterns and seasonality of eating the resource. Sea mammals vary widely in their availability and use. The seasonality of eating the resource can be determined using the "Sea Mammals Summary Spreadsheet."

- The number of eating events in each season is divided by 91 (91 days assumed in each season) to get the probability of eating on any one day.

- When a mean and maximum probability of eating is available, Crystal Ball™ software is used to convert these means and maximums into lognormal distributions. When this is not possible, triangular distributions, ranges or point estimates are used as the estimate for probability of eating.

- Specific information on how the use of sea mammals differs between region and season, please see the "Sea Mammals Summary Spreadsheet" which contains specific information on where proxy information was used, what percentages were used, and reference information.

6.9.6 REFERENCES

Kuhnlein, H., Receveur, O., Chan, H. and Loring, E. (2000). *Assessment of Dietary Benefit/Risk in Inuit Communities*. Centre for Indigenous Peoples' Nutrition and Environment, Macdonald Campus of McGill University.

The Institute of Medicine and the Food and Nutrition Board. (2005). *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids (Macronutrients)*. The National Academies Press, Washington, D.C.

Alaska Department of Fish and Game, Community Subsistence Information System. (2006). Harvest per user calculated by special request for The Tribal Lifeline™ Project. Anchorage, AK.

Ballew, C., Ross, A., Wells, R., Hiratsuka, V., et al. (2004) *Final Report on the Alaska Traditional Diet Survey,* Alaska Native Epidemiology Center, Alaska Native Health Board. Retrieved from http://24.237.7.166/epicenter/pdf/traditional_diet.pdf

Alaska Department of Fish and Game, Division of Subsistence, United States Government. Anchorage, AK. Subsistence Technical Paper Series. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Alaska Department of Fish and Game. *Wildlife Notebook.* Division of Subsistence. Juneau, AK. Retrieved from http://www.adfg.state.ak.us/pubs/notebook/notehome.php

Cattlemen's Beef Board and National Cattlemen's Beef Association. (2006). *How Much To Buy*. Retrieved from http://www.beefitswhatsfordinner.com/aboutbeef/pdf/HowMuchToBuyTable.pdf

Chythlook, M., Coiley, P. and Wolfe, R. (1994). *Subsistence Use of Beluga Whale in the Bristol Bay Area, Part 1 of The Subsistence Harvest of Beluga Whale in Bristol Bay and Cook Inlet by Alaska Natives. Technical Paper 231*. Department of Subsistence, Alaska Department of Fish and Game. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Stanek, R. and Wolfe, R. (1994). *Subsistence Use of Beluga Whale in Cook Inlet, Part 2 of The Subsistence Harvest of Beluga Whale in Bristol Bay and Cook Inlet by Alaska Natives, 1993. Technical Paper 232*. Department of Subsistence, Alaska Department of Fish and Game. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Huntington, H. (1992). Wildlife Management and Subsistence Hunting in AK. University of Washington Press, Seattle, WA. pp. 75, 111, 116, 127, 132, 134.

Jacobson, M and Wentworth, C. (1982). *Kaktovic Subsistence, Land Use Values through Time in the Arctic National Wildlife Refuge Area*. US Fish and Wildlife Service, Northern AK Ecological Services, Fairbanks 1982. pg 29, 35-68.

Marine Mammal Commission: *Annual Report to Congress*. (2006). Bethesda, MD. Retrieved from http://www.mmc.gov/reports/annual/pdf/2005annualreport.pdf

Marine Mammal Commission (2001). *The Marine Mammal Protection Act of 1972, as amended in 2001*. Bethesda, MD. Retrieved from http://www.mmc.gov/legislation/pdf/mmpaamended.pdf

Ahmaogak, Alaska *Eskimo Whaling Commission - Overview and Current Concerns: Lecture* given by Maggie Ahmaogak, Executive Director, AEWC. Retrieved from

http://www.uark.edu/misc/jcdixon/Historic_Whaling/AEWC/aewc_maggie%20presentation.htm#summer

Hess, B. (1999). *Gift of the Whale; the Inupiat Bowhead Hunt, A Sacred Tradition*. Sasquatch Books, Seattle, WA.

Wolfe, R. and Mishler, C. (1995). The *Subsistence Harvest of Harbor Seal and Sea Lion by Alaska Natives in 1994. Technical Paper 236*. Alaska Department of Fish and Game, Subsistence Division. Juneau, Alaska. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Haynes, T. & Mishler, C. (1991). *The Subsistence Harvest and Use of Steller Sea Lions in Alaska. Technical Paper 198*. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Wolfe, R. and Mishler, C. (1996). *The Subsistence Harvest of Harbor Seal and Sea Lion by Alaska Natives in 1995. Technical Paper 238*. Alaska Department of Fish and Game, Subsistence Division. Juneau, Alaska. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

United States Fish and Wildlife Service, Stock Assessment Report. (2002). *Sea Otter (Enhydra lutris): Southwest Alaska Stock*. Retrieved from http://alaska.fws.gov/fisheries/mmm/stock/finalsossouthwestalaska.pdf

United States Fish and Wildlife Service, Stock Assessment Report. (2002). *Sea Otter (Enhydra lutris): Southcentral Alaska Stock*. Retrieved from http://alaska.fws.gov/fisheries/mmm/stock/finalsosouthcentralalaska.pdf

United States Fish and Wildlife Service, Stock Assessment Report. (2002). *Sea Otter (Enhydra lutris): Southeast Alaska Stock*. Retrieved from http://alaska.fws.gov/fisheries/mmm/stock/finalsosoutheastalaska.pdf

Sobelman, S. (1985). *The Economics of Wild Resource Use in Shishmaref, Alaska. Technical Paper 112*. Alaska Department of Fish and Game, Division of Subsistence. Fairbanks, Alaska. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Georgette, S., Coffing, M., Scott, C and Utermohle, C. (1998). *The Subsistence Harvest of Seals and Sea Lions by Alaska Natives in the Norton Sound-Bering Strait Region, Alaska, 1996-97. Technical Paper 242*. Prepared for the National Marine Fisheries Service, Alaska Department of Fish and Game. Division of Subsistence. Juneau, Alaska. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Wolf, R., Fall, J.and Stanek, R. (2004). *The Subsistence Harvest of Harbor Seals and Sea Lions by Alaska Natives in 2004. Technical Paper 303*. Alaska Department of Fish and Game, Division of Subsistence. Juneau, Alaska. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Georgette, S. and Loon, H. (1993). *Subsistence Use of Fish and Wildlife in Kotzebue, A Northwest Alaska Regional Center. Technical Paper 167*. Alaska Department of Fish and Game, Division of Subsistence. Juneau, Alaska. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

George, G. and Bosworth, R. (1988). *Use of Fish and Wildlife by Residents of Angoon, Admiralty Island, Alaska. Technical Paper 159*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, Alaska. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Schroeder, R. and Kookesh, M. (1990). *Subsistence Harvest and Use of Fish and Wildlife Resources and the Effects of Forest Management in Hoonah, Alaska. Technical Paper 142*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, Alaska. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Mills, D. and Fiman, A. (1986). *Fish and Wildlife Use in Yakutat, Alaska: Contemporary Patterns and Changes Technical Paper 131*. Division of Subsistence, Alaska Department of Fish and Game. Douglas, Alaska. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Fall, J., Stanek, R., Brown, L., and Utermohle, C. (1996). *The Harvest and Use of Fish, Wildlife, and Plant Resources in False Pass, Unimak Island, Alaska. Technical Paper 183*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, Alaska. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Coffing, M., Scott, C., and Utermohle, C. (1999). *The Subsistence Harvest of Seals and Sea Lions by Alaska Natives in Three Communities of the Yukon-Kuskokwim Delta, Alaska, 1998-99. Technical Paper 257*. Alaska Department of Fish and Game, Division of Subsistence. Juneau, Alaska. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Fall, J., Chythlook, M., Schichnes, J. and Sinnott, R. (1991). *Walrus Hunting at Togiak, Bristol Bay, Southwest Alaska. Technical Paper No. 212*. Alaska Department of Fish and Game, Division of Subsistence. Juneau, Alaska. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

National Parks Service, Department of the Interior Website. *Subsistence and Walrus Hunting*. Retrieved from

http://www.nps.gov/akso/ParkWise/Students/ReferenceLibrary/BELA/SubsistenceWalrusHunting.htm

US Fish and Wildlife Service: Alaska. Marine Mammals Management Website. *Walrus Fact Sheet*. Retrieved from http://alaska.fws.gov/fisheries/mmm/walrus/nhistory.htm

International Whaling Commission. Aboriginal Catch Limits Web Page. Last updated 10/7/06. Retrieved from http://www.iwcoffice.org/conservation/catches.htm#aborig

6.10 Documentation Specific to Aquatic Invertebrates

6.10.1 TYPES OF AQUATIC INVERTEBRATES INCLUDED IN THE FOOD LIST

Clams

- Littleneck Clams, Steamers – *Protothaca staminea*
- Butter Clams – *Saxidomus gigantea*
- Razor Clams – *Siliqa patula, Siliqa alta*
- Geoduck – *Panopea abrupta*
-

Crab

- King Crab, Stone Crab
  - Red King Crab – *Paralithodes camtschaticus*
  - Blue King Crab – *Paralithodes platypus*
  - Golden King Crab – *Lithodes aequispinus*
- Dungeness Crab – *Cancer magister*
- TannerCrab, Snow Crab – *Chionoecetes bairdi, Chionoecetes opilio*
- Hair Crab – *Erimacrus isenbeckii*

Abalone, Snail – *Haliotis kantschatkana*
Scallops – *Patinopecten caurinus*
Shrimp – Family: *Pandalus*
Sea Urchin – *Strongylocentrotus droebachiensis*
Octopus – *Octopus dofleini*
Cockles – Family: *Clinocardium*
Sea Cucumber – *Parastichopus californicus*
Chitons – *Cryptochiton stelleri*
Mussels – *Mystilus trossulus*
Squid – *Berryteuthis magister*

6.10.2 GENERAL ASSUMPTIONS

- Aquatic invertebrates will be considered based upon their separate species.

- It is assumed that most aquatic invertebrates are eaten cooked with some being eaten raw, but no data is available to quantitatively describe this. Preparation method should be considered by the user of this information when interpreting results.

6.10.3 PORTION SIZE ASSUMPTIONS

- Portion size data are derived from the assessments done by CINE about Inuit dietary practices. Specific information on portion sizes consumed by Alaskans is lacking, so Canadian data are used as proxies. For each age group a mean portion size and number of respondents are listed on the spreadsheets.

- When no information regarding portion size is available, a proxy number will be used (proxy numbers can be identified in the spreadsheets by cells having a number of respondents of zero and they are referenced to their source by a note within the cell). The "Aquatic Invertebrates Summary Spreadsheet", found in Appendix H, also identifies the source of the proxy information.

- An average portion size is assigned for the purposes of determining the number of eating events. Estimates specific to the type of water animal are used to calculate a weighted average for use as the average portion size. The average portion size is indicated in the top portion of each spreadsheet and on the "Aquatic Invertebrates Summary Spreadsheet."

- In cases where nineteen year olds are not accounted for in the data from Receveur et al., they will be grouped into the portion size groups with adults, 20-40y. In some cases portion size estimates do include 19 year olds and this information will then be used.

- It is assumed that portion sizes will remain consistent throughout the year. While this assumption is probably not fully accurate, it is the best assumption that is

available given that there is no information to quantitatively describe how portion sizes fluctuate during the year. It is likely that when fresh aquatic invertebrates are available, larger portions are eaten, but at this time no data are available to define the magnitude of this change.

- Since there is no information regarding portion sizes in children, portion sizes for children are handled using a scale that was developed based upon the Institute of Medicine, Dietary Reference Intakes. This scale uses estimated energy needs to determine what percent of an adult's portion size will be assigned to children of different age groups. For example, estimated energy needs for a female child age 2-3 are 50% of the estimated energy needs of a female adult 20-40. In this case, a portion size for an adult female age 20-40 would be reduced by ½ for a child in this age group. A factor was calculated for each age group and applied to the mean as well as the standard deviation to calculate portion size distributions or point estimates for children based upon an adult reference group. The factors used are listed in Appendix G.

- The age groups according to the IOM do not correlate exactly with the age groups in the Dietary Record Generator™ (DRG). The factor calculated for children age 2-3 based on IOM recommendations is applied to children age 1-2 in the DRG, the factor for children age 4-8 based on IOM recommendations is applied to children age 3-5 in the DRG, the factor for children age 9-13 based on IOM recommendations is applied to children age 6-12 in the DRG, and the factor for children age 14-18 based on IOM recommendations is applied to children age 13-19 in the DRG.

6.10.4 PROBABILITY OF EATING ASSUMPTIONS

- Each region and season showsa single calculated probability of eating which will be applied to all age groups. It is likely that younger generations eat fewer of some subsistence foods than do the older generations as market foods become more available. However, there is no quantitative data to inform how age affects

probability of eating. In the interest of being conservative, it will be assumed that the probability of eating will apply to all age groups.

- Harvest estimates from the Community Subsistence Information System are calculated as pounds of resource per user per year. The "user" is defined as a person within a family unit which reports that they used the resource. The family does not have to have hunted or gathered the resource to report that they use the resource. This is important because it is well documented that in some cases the number of people hunting/gathering a resource is much smaller than those who use it. The distribution network of traditional foods is extensive in most locations. Households surveyed by ADFG who report using a resource are multiplied by the average number of people in a household for that specific community and this number is the "denominator" or the number of users in the community.

- "Users" of resources are not necessarily only Alaska Natives but rather are residents of Alaska who harvest under subsistence regulations. In rural communities, a larger percentage of the population is likely to be Alaska Native than in urban centers. In most rural regions, the harvest data may be fairly representative of intake in Alaska Native populations, as the number of non-native residents using traditional resources will be small. However, in urban centers, the mix of Native and non-native people is much more significant and therefore the harvest number will represent this mix of users. Native and non-native "users" are likely to use resources differently from one another. Urban and rural Alaska Native users may also use resources differently. This effect may be fairly substantial when considering the use of some aquatic invertebrates.

- ADFG CSIS reports the harvest of aquatic invertebrates as raw dressed weight. From a "western" standpoint, this may be thought of as the raw weight of meat when it comes from the grocery store. This harvest per user estimate has been adjusted for cooking/cleaning losses by applying a factor of 0.75 to the original estimate from ADFG. There is no information regarding weight loss from

cooking aquatic invertebrates. The factor of 0.75 for cooking loss is an estimated factor and should in reality reflect a greater "reduction" in weight. This issue is complicated by the fact that fat content of the resource, cooking method, drying time, drying conditions, etc will all influence how much weight is lost in the process. The only reference held at present is a "yield table" from the National Cattleman's Beef Council which describes cooking losses in beef. This reference reveals a cooking yield of 28-75% depending on the type/cut of meat. In the interest of conservative estimates, the 75% yield will be used until better information can be attained.

- The average total pounds per user as calculated from the Alaska Traditional Diet Project are shown within the cells of the spreadsheets. Major contributors to the diet should be accounted for as the report includes foods reported by greater than 50% of the population as well as those contributing to the largest total weight consumed.

- It is difficult to determine how areas surveyed by the ATDP should be applied to the Ecological-Cultural Zones. The areas surveyed by the ATDP do not exactly fit the Zones used in the creation of the Alaska Compendium of Dietary Files. Recognizing that these estimates are not specific for the Zones, the Subarctic Interior Zone is assigned an average consumption from the Tanana Chiefs Conference (TCC) and the Yukon Kuskokwim Health Corporation (YKHC); the Arctic/Subarctic Coastal Zone is assigned an average consumption from the Yukon-Kuskokwim Health Corporation (YKHC), Bristol Bay Area Health Corporation (BBAHC), and Norton Sound Health Corporation (NSHC); the South East Zone is assigned estimates from the Southeast Alaska Regional Health Consortium (SEARHC); and the Aleutian Pacific Zone is assigned an average from the Bristol Bay Area Health Corporation (BBAHC) and the Southeast Alaska Regional Health Consortium (SEARHC).

- When mean estimates from the ATDP are averaged to better fit the zones used in the Alaska Compendium of Dietary Files, the highest maximum value is

preserved (not averaged with other maximum estimates) in order that the high end consumer is represented in the files.

- Depending on the resource under consideration, CSIS numbers may be a more specific estimate of consumption of the resource in a given zone due to the manipulation of the estimates from the ATDP. This is probably the case in zones where the estimates from different ATDP regions were very different. The average may not be an accurate representation of the true consumption in the zone. Estimates from the ATDP may be more accurate estimates of consumption given that it measures consumption and not harvest as a proxy. This is probably true in instances where the species is used for more than just human food (dog food, Native crafts, etc) causing the harvest number to overestimate the true consumption. Given the manipulation necessary for both sets of data, it is important to compare estimates from both sources and to note that often they fall very close to one another. Where this is the case, a fair degree of certainty can be given to the estimate. When the estimates are very divergent, more data is necessary.

- In ideal situations, a distribution would be available for probability of eating. When this is not available the ranges between ATDP mean, ATDP max, and CSIS estimates will be used in place of a distribution or point estimate. The lowest and highest estimates are used as the end points of the range. These numbers are estimates carrying no information related to the spread or centrality of these numbers and should be interpreted with caution.

6.10.5 PROBABILITY OF EATING CALCULATIONS

- The calculation begins with average (from CSIS or ATDP) or maximum (from ATDP) total pounds of the specific resource per person (user) per year.

- Pounds per user per year are converted into number of eating events per year using the following equation. Pounds of resource X 454 g / average serving size (g).

- The calculated number of eating events is then subdivided into seasons based upon what is known about harvest patterns and seasonality of eating the resource. Aquatic invertebrates vary widely in their availability and use. The seasonality of eating the resource can be determined using the "Aquatic Invertebrates Summary Spreadsheet."

- The number of eating events in each season is divided by 91 (91 days assumed in each season) to get the probability of eating on any one day.

- When a mean and maximum probability of eating is available, Crystal Ball™ software is used to convert these means and maximums into lognormal distributions. When this is not possible, triangular distributions, ranges or point estimates are used as the estimate for probability of easting.

- Specific information on how the use of aquatic invertebrates differs between region and season, please see the "Water Animal Summary Spreadsheet" which contains specific information on where proxy information was used, what percentages were used, and reference information.

6.10.6 REFERENCES

Kuhnlein, H., Receveur, O., Chan, H., and Loring, E. (2000). *Assessment of Dietary Benefit/Risk in Inuit Communities*. Centre for Indigenous Peoples' Nutrition and Environment, Macdonald Campus of McGill University.

The Institute of Medicine and the Food and Nutrition Board. (2005). *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein and Amino Acids (Macronutrients)*. The National Academies Press, Washington, D.C.

Alaska Department of Fish and Game, Community Subsistence Information System. (2006). Harvest per user calculated by special request for The Tribal Lifeline™ Project. Anchorage, AK.

Ballew, C., Ross, A., Wells, R., Hiratsuka, V., et al. (2004) Final Report on the Alaska Traditional Diet Survey, Alaska Native Epidemiology Center, Alaska Native Health Board. Retrieved from http://24.237.7.166/epicenter/pdf/traditional_diet.pdf

Alaska Department of Fish and Game, Division of Subsistence, United States Government. Anchorage, AK. Subsistence Technical Paper Series. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Alaska Department of Fish and Game. *Wildlife Notebook.* Division of Subsistence. Juneau, AK. Retrieved from http://www.adfg.state.ak.us/pubs/notebook/notehome.php

Cattlemen's Beef Board and National Cattlemen's Beef Association. (2006). *How Much To Buy*. Retrieved from http://www.beefitswhatsfordinner.com/aboutbeef/pdf/HowMuchToBuyTable.pdf

Betts, M. (1994). *The Subsistence Eulachon Fishery of the Chilkat and Chilkoot Rivers, Southeast Alaska. Technical Paper 213*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Mathews, V., M. Kookesh, and R. Bosworth. (1990). Subsistence Harvest and Use of Sea Cucumber in Southeast Alaska: With Specific Reference to Sea Cucumber Harvest and Use by Residents of Craig, Klawock and Hydaburg. Technical Paper 190. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Fall, J., R. Stanek, L. Brown, and C. Utermohle. (1996). *The Harvest and Use of Fish, Wildlife, and Plant Resources in False Pass, Unimak Island, Alaska. Technical Paper 183*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Morris, J. (1987*). Fish and Wildlife Uses in Six Alaska Peninsula Communities: Egegik, Chignik, Chignik Lagoon, Chignik Lake, Perryville, and Ivanof Bay. Technical Paper 151*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Stratton, L.and E. Chisum. (1986). *Resource Use Patterns in Chenega, Western Prince William Sound: Chenega in the 1960s and Chenega Bay 1984-1986. Technical Paper 139*. Division of Subsistence, Alaska Department of Fish and Game. Anchorage, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Morris, J. (1986). *Subsistence Production and Exchange in the Iliamna Lake Region, Southwest Alaska. 1982-1983. Technical Paper 136*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Mills, D. and A. Firman. (1986). *Fish and Wildlife Use in Yakutat, Alaska: Contemporary Patterns and Changes. Technical Paper 131*. Division of Subsistence, Alaska Department of Fish and Game. Douglas, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Morris, J. (1985). *The Use of Fish and Wildlife Resources by Residents of the Bristol Bay Borough, Alaska. Technical Paper 123*. Division of Subsistence, Alaska Department of Fish and Game. AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Magdanz, J. and A. Olanna. (1985). *Bering Sea Subsistence King Crab Fishery. Update. Technical Paper 117*. Division of Subsistence, Alaska Department of Fish and Game. Nome, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Wright, J., J. Morris, and R. Schroeder. (1985). *Bristol Bay Regional Subsistence Profile. Technical Paper 114*. Division of Subsistence, Alaska Department of Fish and Game. Dillingham, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Stanek, R. (1985). *Patterns of Resource Use in English Bay and Port Graham, Alaska. Technical Paper 104*. Division of Subsistence, Alaska Department of Fish and Game. Anchorage, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

George, G., M. Kookesh, D. Mills, and J. Fall. (1984). *The Non-Commercial Harvest of Crab in Southeast Alaska: A Summary of Available Information. Technical Paper 103*. Division of Subsistence, Alaska Department of Fish and Game. Juneau, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

Mills, D. (1982). *The Procurement and Use of Abalone in Southeast Alaska. Technical Paper 40*. Division of Subsistence, Alaska Department of Fish and Game. South Eastern Region, AK. Retrieved from http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm

CHAPTER 7. RECOMMENDATIONS/AUTHORS NOTES

The Tribal LifeLine™ Project is making significant strides in accomplishing the goal of modifying the existing LifeLine™ exposure and risk assessment software to make it capable of considering the dietary practices, lifestyle patterns and traditional activities enjoyed by Alaska Natives. The DRG software used in the creation of the Compendium is one application in a suite of forthcoming software tools which fulfills the first part of the goal; to consider dietary practices of Alaska Natives. The Compendium is an example of a product resulting from the application of this tool along with the best available information about harvesting, preparation and consumption of traditional foods by the peoples in the tribal communities of Alaska.

This initial application of using the DRG tool to describe the opportunities for dietary exposure in Alaska Native communities required that data from multiple sources and in a variety of arrangements be collected, integrated, and formatted with the DRG tool. This could not have been accomplished without extensive guidance from experts. Experts were considered authoritative due to academic credentials or because of their practical knowledge of the dietary patterns of Native communities, food sources, distribution, preparation, and consumption.

The Compendium has been constructed from the best available evidence, data, and expert input as was available to LifeLine™ scientists. This good faith effort is a significant step in describing dietary intake in Alaska Native communities which have been previously excluded from dietary exposure assessments. While this is a significant step, there remain poorly described foods or consumption parameters due to a lack of available information. It is anticipated that the Compendium represents a foundation upon which further work will be done to describe dietary practices in Alaska and in other unique communities. As with any DRG file, there is the opportunity to customize these files with more up to date or relevant information as it becomes available.

The transparency of the DRG files within the Compendium serves an important role to highlight the need for more information related to Alaska Native dietary practices. There are several places within the Compendium where little or no information could be located pertaining to certain foods or consumption parameters. In these cases proxy information is used or good faith estimates are made. These areas are recorded in the accompanying documentation and are suggested areas for further research. For example, there is a huge data gap when it comes to the portion sizes of foods eaten in Alaska Native communities. Almost all portion size estimates used in construction of the Alaskan Compendium are taken from studies done in Canadian First Nations communities. While this is the best information available at present, if data more relevant to Alaska Native communities becomes available, the Compendium files can be updated. The Compendium files provide the opportunity to focus research funding on the most outstanding gaps in knowledge.

This discussion raises the issue of standards of quality for what data can be inputted into the DRG. The Compendium stands as an example of an effort to use the best available information supported by numerous references and expert input in the creation of a file. Since these files represent a collection of information form various sources, some of which are not customary to use in dietary assessments, extensive referencing accompanies the Compendium files. This referencing is necessary in maintaining the quality of the resulting file as well as the standard of transparency. It is suggested that these standards of quality and transparency, accomplished through use of best available information, review by experts, and extensive referencing are adopted by users of the DRG tool in the creation of all subsequent DRG files.

It is the hope of the authors that the Alaska Compendium is the beginning of future work to update and amend the dietary files describing Alaska Native communities and creation of new files describing other unique populations. Additional versions of the DRG software are anticipated which will contain enhanced features to allow users to more closely describe dietary practices in a community. The LifeLine Group™welcomes feedback from users of the DRG software as well as users of the Alaska Compendium. It

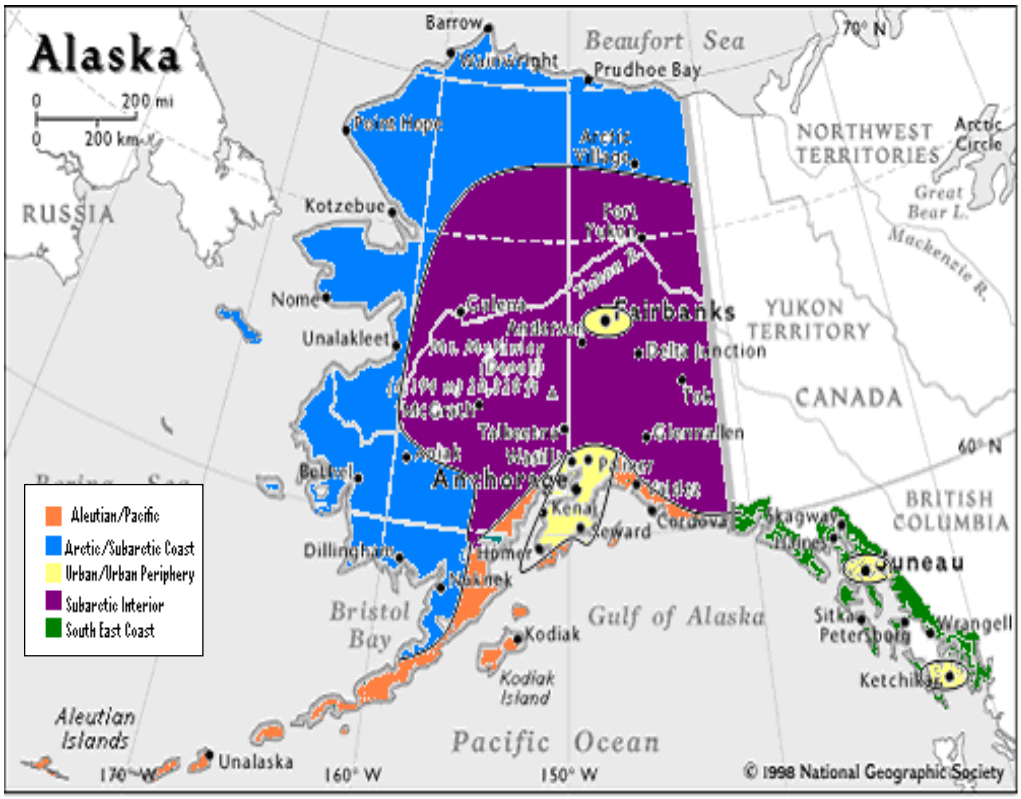
is only through dialogue with users of these tools that the products can meet the needs of clients and communities.

Development of the Alaska Compendium represents a process to create a database that has a place in the public health policy discussion. The DRG and the resulting Alaska Compendium establishes a capability to better describe dietary profiles for Alaska Natives and any other unique population groups. It has been the distinct pleasure of The LifeLine Group™ to work on this project with the assistance of many individuals, agencies, and communities. The LifeLine Group™ scientists anticipate further advances in the use of the software tools and Alaska Compendium.

APPENDIX A – MAP OF ECOLOGICAL-CULTURAL ZONES

ADF&GSD Ecological/Cultural Zones

http://www.subsistence.adfg.state.ak.us/download/tecdoc00.pdf



APPENDIX B DEFINITION OF ECOLOGICAL-CULTURAL ZONES

The ecological cultural zones divide the state into five regions defined by the ADFG Division of Subsistence. The ecological-cultural zones reflect the predominant Alaska Native culture associated with major ecological regions: Aleutian Pacific (Aleut-Alutiiq), Arctic-Subarctic Coast (Inupiat-Yupik), Southeast Alaska Coast (Tlingit-Haida), Subarctic Interior (Athabaskan) and Urban-Urban Periphery (recent major population centers). This system was selected for further analyses for several reasons. First, it may reflect coastal, interior and urban harvest patterns better than other systems. Second, ecological regions may be more justifiable from a scientific perspective than are administrative jurisdictions. Third, it was suggested by Charles J. Utermohle, Ph.D., an ADFG Research Analyst who is knowledgeable about the CPDB, that ecological cultural zones might best differentiate regions in terms of subsistence harvest.

Zone 1. The Arctic-Subarctic Coast/Yupik-Inupiaq zone includes lands bordered by Bristol Bay, Norton Sound, Kotzebue Sound and the Arctic Ocean. It extends to the Canadian border. The predominant Native cultures in the region are Inupiaq Eskimos in the northern portion of the region and Yupik Eskimos on St. Lawrence Island and in the southern portion.

Zone 2. Aleutian Pacific/Aleut-Alutiiq Zone includes the Aleutian Chain, Kodiak Island and lands surrounding Prince William Sound, east to Icy Cape and Mt. St. Elias area. Aleuts and Alutiiqs are the predominant Native groups in this zone.

Zone 3. Subarctic Interior/Athabascan Region includes the Yukon, Kuskokwim, and Copper River drainage areas, which extend west to but not including the Yukon-Kuskokwim Delta and east to the Canadian border. Athabascan Indians are the predominant Alaska Native group in this region.

Zone 4. Southeast Alaska Coast/Tlingit-Haida Zone includes the islands and mainland of the Alaska Panhandle that extends south from Icy Cape and Mt. St Elias to the Canadian border. Tlingit and Haida Indians predominate in this region.

Zone 5. Urban/Urban-Periphery is a non-contiguous region comprised of urban communities and the areas around them. These are recent population centers that include Anchorage, Fairbanks, Juneau and Ketchikan.

Excerpt from:
Ponce, R., Bartell, S., Haness, S., & Nobmann, E. (1997). *Establishing Alaska Subsistence Exposure Scenarios*. Prepared for the Alaska Department of Environmental Conservation. IDM Consulting.

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APPENDIX C ALASKAN COMMUNITIES BY ECOLOGICAL-CULTURAL ZONES

Ecological-Cultural Region	Community Name
Arctic/Subarctic Coast	Akiachak
Arctic/Subarctic Coast	Akiak
Arctic/Subarctic Coast	Alakanuk
Arctic/Subarctic Coast	Aleknagik
Arctic/Subarctic Coast	Ambler
Arctic/Subarctic Coast	Anaktuvuk Pass
Arctic/Subarctic Coast	Aniak
Arctic/Subarctic Coast	Atqasuk
Arctic/Subarctic Coast	Atmautluak
Arctic/Subarctic Coast	Balance of Aniak Census Sub-Area
Arctic/Subarctic Coast	Balance of Barrow-Point Hope Census Sub-Area
Arctic/Subarctic Coast	Balance of Northwest Arctic Borough
Arctic/Subarctic Coast	Balance of Lower Kuskokwim Census Sub-Area
Arctic/Subarctic Coast	Balance of Nome Census Area
Arctic/Subarctic Coast	Balance of Prudhoe Bay-Kaktovik Census Sub-Area
Arctic/Subarctic Coast	Balance of Wade Hampton Census Sub-Area
Arctic/Subarctic Coast	Barrow
Arctic/Subarctic Coast	Bethel
Arctic/Subarctic Coast	Brevig Mission
Arctic/Subarctic Coast	Buckland
Arctic/Subarctic Coast	Cape Newenham Census Designated Place
Arctic/Subarctic Coast	Chefornak
Arctic/Subarctic Coast	Chevak
Arctic/Subarctic Coast	Chuathbaluk
Arctic/Subarctic Coast	Clark's Point
Arctic/Subarctic Coast	Council
Arctic/Subarctic Coast	Crooked Creek
Arctic/Subarctic Coast	Deadhorse
Arctic/Subarctic Coast	Deering
Arctic/Subarctic Coast	Dillingham
Arctic/Subarctic Coast	Diomede
Arctic/Subarctic Coast	Eek
Arctic/Subarctic Coast	Egegik
Arctic/Subarctic Coast	Ekwok
Arctic/Subarctic Coast	Elim
Arctic/Subarctic Coast	Emmonak
Arctic/Subarctic Coast	Gambell
Arctic/Subarctic Coast	Golovin
Arctic/Subarctic Coast	Goodnews Bay
Arctic/Subarctic Coast	Hooper Bay
Arctic/Subarctic Coast	Igiugig
Arctic/Subarctic Coast	Igloo
Arctic/Subarctic Coast	Iliamna

Ecological-Cultural Region	Community Name
Arctic/Subarctic Coast	Kaktovik
Arctic/Subarctic Coast	Kasigluk
Arctic/Subarctic Coast	Kiana
Arctic/Subarctic Coast	King Salmon
Arctic/Subarctic Coast	Kipnuk
Arctic/Subarctic Coast	Kivalina
Arctic/Subarctic Coast	Kobuk
Arctic/Subarctic Coast	Kokhanok
Arctic/Subarctic Coast	Koliganek
Arctic/Subarctic Coast	Kongiganak
Arctic/Subarctic Coast	Kotlik
Arctic/Subarctic Coast	Kotzebue
Arctic/Subarctic Coast	Koyuk
Arctic/Subarctic Coast	Kwethluk
Arctic/Subarctic Coast	Kwigillingok
Arctic/Subarctic Coast	Levelock
Arctic/Subarctic Coast	Lower Kalskag
Arctic/Subarctic Coast	Manokotak
Arctic/Subarctic Coast	Marshall (Fortuna Ledge)
Arctic/Subarctic Coast	Mekoryuk
Arctic/Subarctic Coast	Mountain Village
Arctic/Subarctic Coast	Naknek
Arctic/Subarctic Coast	Napakiak
Arctic/Subarctic Coast	Napaskiak
Arctic/Subarctic Coast	New Stuyahok
Arctic/Subarctic Coast	Newhalen
Arctic/Subarctic Coast	Newtok
Arctic/Subarctic Coast	Nightmute
Arctic/Subarctic Coast	Noatak
Arctic/Subarctic Coast	Nome
Arctic/Subarctic Coast	Noorvik
Arctic/Subarctic Coast	Nuiqsut
Arctic/Subarctic Coast	Nunapitchuk
Arctic/Subarctic Coast	Oscarville
Arctic/Subarctic Coast	Perkinsville Census Designated Place
Arctic/Subarctic Coast	Pilot Point
Arctic/Subarctic Coast	Pilot Station
Arctic/Subarctic Coast	Pitka's Point
Arctic/Subarctic Coast	Platinum
Arctic/Subarctic Coast	Point Hope
Arctic/Subarctic Coast	Point Lay
Arctic/Subarctic Coast	Port Clarence
Arctic/Subarctic Coast	Port Heiden
Arctic/Subarctic Coast	Portage Creek
Arctic/Subarctic Coast	Prudhoe Bay
Arctic/Subarctic Coast	Quinhagak
Arctic/Subarctic Coast	Red Devil
Arctic/Subarctic Coast	Russian Mission
Arctic/Subarctic Coast	Savoonga

Ecological-Cultural Region	Community Name
Arctic/Subarctic Coast	Scammon Bay
Arctic/Subarctic Coast	Selawik
Arctic/Subarctic Coast	Shaktoolik
Arctic/Subarctic Coast	Nunam Iqua (Sheldon Point)
Arctic/Subarctic Coast	Shishmaref
Arctic/Subarctic Coast	Shungnak
Arctic/Subarctic Coast	Sleetmute
Arctic/Subarctic Coast	Solomon
Arctic/Subarctic Coast	South Naknek
Arctic/Subarctic Coast	Sparrevohn Air Force Base
Arctic/Subarctic Coast	Saint George
Arctic/Subarctic Coast	Saint Marys (Andreafsky)
Arctic/Subarctic Coast	Saint Michael
Arctic/Subarctic Coast	Saint Paul
Arctic/Subarctic Coast	Stebbins
Arctic/Subarctic Coast	Teller
Arctic/Subarctic Coast	Togiak
Arctic/Subarctic Coast	Toksook Bay
Arctic/Subarctic Coast	Tuluksak
Arctic/Subarctic Coast	Tuntutuliak
Arctic/Subarctic Coast	Tununak
Arctic/Subarctic Coast	Twin Hills
Arctic/Subarctic Coast	Ugashik
Arctic/Subarctic Coast	Unalakleet
Arctic/Subarctic Coast	Upper Kalskag
Arctic/Subarctic Coast	Wainwright
Arctic/Subarctic Coast	Wales
Arctic/Subarctic Coast	White Mountain
Arctic/Subarctic Coast	Cape Lisburne
Arctic/Subarctic Coast	Pilot Point/Ugashik
Aleutian/Pacific	Adak Station
Aleutian/Pacific	Akhiok
Aleutian/Pacific	Akutan
Aleutian/Pacific	Atka
Aleutian/Pacific	Balance of Aleutians West Census Area
Aleutian/Pacific	Balance of Bristol Bay Census Area
Aleutian/Pacific	Balance of Cordova Census Sub-Area
Aleutian/Pacific	Balance of Dillingham Census Area
Aleutian/Pacific	Kodiak Road
Aleutian/Pacific	Balance of Prince William Sound Census Sub-Area
Aleutian/Pacific	Chenega
Aleutian/Pacific	Chignik Bay
Aleutian/Pacific	Chignik Lagoon
Aleutian/Pacific	Chignik Lake
Aleutian/Pacific	Cold Bay
Aleutian/Pacific	Cordova
Aleutian/Pacific	Nanwalek
Aleutian/Pacific	False Pass
Aleutian/Pacific	Halibut Cove

Ecological-Cultural Region	Community Name
Aleutian/Pacific	Ivanof Bay
Aleutian/Pacific	Jakolof Bay Census Designated Place
Aleutian/Pacific	Karluk
Aleutian/Pacific	King Cove
Aleutian/Pacific	Kodiak City
Aleutian/Pacific	Kodiak Coast Guard Station
Aleutian/Pacific	Larsen Bay
Aleutian/Pacific	Nelson Lagoon
Aleutian/Pacific	Nikolski
Aleutian/Pacific	Old Harbor
Aleutian/Pacific	Ouzinkie
Aleutian/Pacific	Perryville
Aleutian/Pacific	Port Graham
Aleutian/Pacific	Port Lions
Aleutian/Pacific	San Juan Bay
Aleutian/Pacific	Sand Point
Aleutian/Pacific	Seldovia
Aleutian/Pacific	Shemya Station Census Designated Place
Aleutian/Pacific	Tatitlek
Aleutian/Pacific	Unalaska
Aleutian/Pacific	Valdez
Aleutian/Pacific	Chiniak
Aleutian/Pacific	Eyak
Aleutian/Pacific	Women's Bay
Aleutian/Pacific	Balance of Lake and Peninsula Borough
Aleutian/Pacific	Balance of Aleutians East Borough
Aleutian/Pacific	Amchitka
Subarctic Interior	Alatna
Subarctic Interior	Alexander Creek
Subarctic Interior	Allakaket/Alatna
Subarctic Interior	Anderson
Subarctic Interior	Anvik
Subarctic Interior	Arctic Village
Subarctic Interior	Balance of Copper River Census Sub-Area
Subarctic Interior	Balance of Eielson Reservation Census Sub-Area
Subarctic Interior	Balance of Koyukuk-Middle Yukon Census Sub-Area
Subarctic Interior	Balance of McGrath-Holy Cross Census Sub-Area
Subarctic Interior	Balance of Yukon Flats Census Sub-Area
Subarctic Interior	Beaver
Subarctic Interior	Beluga
Subarctic Interior	Bettles/Evansville
Subarctic Interior	Big Delta
Subarctic Interior	Birch Creek
Subarctic Interior	Campion Station
Subarctic Interior	Cantwell
Subarctic Interior	Central
Subarctic Interior	Chalkyitsik
Subarctic Interior	Chickaloon
Subarctic Interior	Chicken

Ecological-Cultural Region	Community Name
Subarctic Interior	Chisana
Subarctic Interior	Cheesh'na (Chistochina)
Subarctic Interior	Chitina
Subarctic Interior	Circle
Subarctic Interior	Circle Hot Springs Station
Subarctic Interior	Copper Center
Subarctic Interior	Delta Junction
Subarctic Interior	Denali Highway
Subarctic Interior	Dot Lake
Subarctic Interior	Eagle
Subarctic Interior	East Glenn Highway
Subarctic Interior	Fort Yukon
Subarctic Interior	Gakona
Subarctic Interior	Galena
Subarctic Interior	Glennallen
Subarctic Interior	Grayling
Subarctic Interior	Gulkana
Subarctic Interior	Harding Lake Census Designated Place
Subarctic Interior	Healy
Subarctic Interior	Healy Lake
Subarctic Interior	Holy Cross
Subarctic Interior	Hughes
Subarctic Interior	Huslia
Subarctic Interior	Indian Mountain Census Designated Place
Subarctic Interior	Kaltag
Subarctic Interior	Kenny Lake
Subarctic Interior	Koyukuk
Subarctic Interior	Lake Louise
Subarctic Interior	Lake Minchumina
Subarctic Interior	Lime Village
Subarctic Interior	Livengood
Subarctic Interior	Lower Tonsina
Subarctic Interior	Manley Hot Springs
Subarctic Interior	Matanuska Glacier
Subarctic Interior	McCarthy Road
Subarctic Interior	McGrath
Subarctic Interior	Mckinley Park
Subarctic Interior	Mentasta
Subarctic Interior	Minto
Subarctic Interior	Moose Creek Census Designated Place
Subarctic Interior	Nabesna Road
Subarctic Interior	Nenana
Subarctic Interior	Nikolai
Subarctic Interior	Nondalton
Subarctic Interior	North Wrangell Mountains
Subarctic Interior	Northway
Subarctic Interior	Nulato
Subarctic Interior	Paxson-Sourdough
Subarctic Interior	Pedro Bay

Ecological-Cultural Region	Community Name
Subarctic Interior	Port Alsworth
Subarctic Interior	Rampart
Subarctic Interior	Ruby city
Subarctic Interior	Shageluk
Subarctic Interior	Sheep Mountain
Subarctic Interior	Skwentna
Subarctic Interior	Slana
Subarctic Interior	South Wrangell Mountains
Subarctic Interior	Stevens Village
Subarctic Interior	Stony River
Subarctic Interior	Takotna
Subarctic Interior	Tanacross
Subarctic Interior	Tanana
Subarctic Interior	Tatalina Station Census Designated Place
Subarctic Interior	Tazlina
Subarctic Interior	Telida
Subarctic Interior	Tetlin
Subarctic Interior	Tok
Subarctic Interior	Tonsina
Subarctic Interior	Tyonek
Subarctic Interior	Usibelli Mine
Subarctic Interior	Venetie
Subarctic Interior	Wiseman
Subarctic Interior	Dry Creek
Subarctic Interior	Evansville
Subarctic Interior	Ferry
Subarctic Interior	Lignite
Subarctic Interior	McCarthy
Subarctic Interior	Northway Junction
Subarctic Interior	Northway Village
Subarctic Interior	Lake Creek
Subarctic Interior	Balance of Denali Borough
Subarctic Interior	Mentasta Pass
Subarctic Interior	Paxson
Subarctic Interior	Slana Homestead North
Subarctic Interior	Slana Homestead South
Subarctic Interior	Sourdough
Subarctic Interior	West Glenn Highway
Subarctic Interior	Eagle Village
Subarctic Interior	Alcan
Subarctic Interior	Allakaket
Subarctic Interior	Bettles
Subarctic Interior	Canyon Village
Subarctic Interior	Mendeltna
Subarctic Interior	Copperville
South East Coast	Angoon
South East Coast	Balance of Angoon Census Sub-Area
South East Coast	Balance of Haines Census Area
South East Coast	Balance of Hoonah Census Sub-Area

Ecological-Cultural Region	Community Name
South East Coast	Balance of Outer Ketchikan Census Sub-Area
South East Coast	Balance of Petersburg Census Sub-Area
South East Coast	Balance of Prince of Wales Census Sub-Area
South East Coast	Balance of Skagway Census Sub-Area
South East Coast	Balance of Wrangell Census Sub-Area
South East Coast	Craig
South East Coast	Edna Bay
South East Coast	Elfin Cove
South East Coast	Gustavus
South East Coast	Haines
South East Coast	Hollis
South East Coast	Hoonah
South East Coast	Hydaburg
South East Coast	Hyder
South East Coast	Kake
South East Coast	Kasaan
South East Coast	Klawock
South East Coast	Klukwan
South East Coast	Metlakatla
South East Coast	Meyers Chuck
South East Coast	Pelican
South East Coast	Petersburg
South East Coast	Point Baker
South East Coast	Port Alexander
South East Coast	Sitka
South East Coast	Skagway
South East Coast	Tenakee Springs
South East Coast	Thorne Bay
South East Coast	Wrangell
South East Coast	Yakutat
South East Coast	Cape Pole
South East Coast	Coffman Cove
South East Coast	Whale Pass
South East Coast	Cube Cove
South East Coast	Dora Bay
South East Coast	Freshwater Bay
South East Coast	Game Creek Census Designated Place
South East Coast	Hobart Bay
South East Coast	LaBouchere Bay
South East Coast	Long Island
South East Coast	Lutak Census Designated Place
South East Coast	Mosquito Lake Census Designated Place
South East Coast	Naukati Bay
South East Coast	Polk Inlet
South East Coast	Port Alice
South East Coast	Saint John's Harbor
South East Coast	Whitestone Logging Camp
South East Coast	Beecher Pass
South East Coast	Port Protection

Ecological-Cultural Region	Community Name
South East Coast	Annette
South East Coast	Rowan Bay
South East Coast	Covenant Life Census Designated Place
Urban/Urban Periphery	Anchor Point
Urban/Urban Periphery	Anchorage
Urban/Urban Periphery	Balance of Fairbanks North Star Census Sub-Area
Urban/Urban Periphery	Balance of Kenai-Cook Inlet Census Sub-Area
Urban/Urban Periphery	Balance of Ketchikan Census Area
Urban/Urban Periphery	Balance of Matanuska-Susitna Census Area
Urban/Urban Periphery	Balance of Seward Census Sub-Area
Urban/Urban Periphery	Balance of Southeast Fairbanks Census Area
Urban/Urban Periphery	Big Lake
Urban/Urban Periphery	Butte Census Designated Place
Urban/Urban Periphery	Chase
Urban/Urban Periphery	Clam Gulch
Urban/Urban Periphery	Cohoe
Urban/Urban Periphery	Cooper Landing
Urban/Urban Periphery	Eielson Air Force Base
Urban/Urban Periphery	Ester
Urban/Urban Periphery	Fairbanks
Urban/Urban Periphery	Fox
Urban/Urban Periphery	Fritz Creek Census Designated Place
Urban/Urban Periphery	Fort Greely
Urban/Urban Periphery	Homer
Urban/Urban Periphery	Hope
Urban/Urban Periphery	Houston
Urban/Urban Periphery	Juneau
Urban/Urban Periphery	Kachemak City
Urban/Urban Periphery	Kalifonsky Census Designated Place
Urban/Urban Periphery	Kasilof
Urban/Urban Periphery	Kenai
Urban/Urban Periphery	Ketchikan
Urban/Urban Periphery	Knik
Urban/Urban Periphery	Montana Census Designated Place
Urban/Urban Periphery	Moose Pass
Urban/Urban Periphery	Nikiski
Urban/Urban Periphery	Ninilchik
Urban/Urban Periphery	North Pole
Urban/Urban Periphery	Palmer
Urban/Urban Periphery	Petersville Road
Urban/Urban Periphery	Salamatof Census Designated Place
Urban/Urban Periphery	Salcha
Urban/Urban Periphery	Saxman
Urban/Urban Periphery	Seward
Urban/Urban Periphery	Soldotna
Urban/Urban Periphery	Sterling
Urban/Urban Periphery	Sutton
Urban/Urban Periphery	Talkeetna
Urban/Urban Periphery	Trapper Creek

Ecological-Cultural Region	Community Name
Urban/Urban Periphery	Two Rivers
Urban/Urban Periphery	Wasilla
Urban/Urban Periphery	Whittier
Urban/Urban Periphery	Willow
Urban/Urban Periphery	Crown Point
Urban/Urban Periphery	Fox River
Urban/Urban Periphery	Grouse Creek Group
Urban/Urban Periphery	Happy Valley
Urban/Urban Periphery	Lazy Mountain
Urban/Urban Periphery	Meadow Lakes
Urban/Urban Periphery	Nikolaevsk
Urban/Urban Periphery	Pleasant Valley
Urban/Urban Periphery	Primrose
Urban/Urban Periphery	Ridgeway
Urban/Urban Periphery	Hurricane-Broad Pass
Urban/Urban Periphery	Gold Creek
Urban/Urban Periphery	Parks Highway South
Urban/Urban Periphery	Voznesenka
Urban/Urban Periphery	North Fork Road

APPENDIX D COMMUNITY SUBSISTENCE INFORMATION SYSTEM "USER" NUMBERS

APPENDIX E EXPERT OPINION ON COMMONLY CONSUMED FOODS FROM THE ALASKA TRADITIONAL DIET PROJECT

Number of regions with Foods Eaten by >50% of Respondents (out of 5 Regions, Tables 4a-e)	Ranked by number of regions
Blueberries (5)	5
Salmon, king cooked (5)	5
Salmon, king dried (5)	5
Salmon, silver cooked (5)	5
Salmon, silver dried (5)	5
Whitefish, cooked (4)	4
Moose, cooked (4)	4
Goose (4)	4
Cloudberries/salmonberries (3)	3
Blackberries/crowberries (3)	3
Cranberries (3)	3
Seal oil (3)	3
Salmon, chum cooked (3)	3
Salmon, chum dried (3)	3
Salmon, red, cooked (3)	3
Salmon, red, dried (3)	3
Caribou, cooked (3)	3
Moose, heart (3)	3
Ptarmigan (3)	3
Red huckleberries (2)	2
Northern Pike, dried (2)	2
Salmon, pink cooked (2)	2
Salmon, pink dried (2)	2
Sheefish (2)	2
Halibut, cooked (2)	2
Clams (2)	2
Caribou, dried (2)	2
Caribou, bone marrow (2)	2
Caribou heart (2)	2
Beaver (2)	2
Moose, fat (2)	2
Moose, bone marrow (2)	2
Moose, liver (2)	2
Bearded seal (oogruk) (2)	2
Goose, snow (2)	2
Sea gull egg (2)	2
Salmonberries, "Highbush" (1)	1
Raspberries (1)	1

Number of regions with Foods Eaten by >50% of Respondents (out of 5 Regions, Tables 4a-e)	Ranked by number of regions
Black fish (1)	1
Eulachon, cooked (1)	1
Eulachon, dried (1)	1
Ling cod, cooked (1)	1
Tom cod, cooked (1)	1
Trout, unspecified (1)	1
Whitefish, dried (1)	1
Yellow-eyed Snapper (1)	1
Halibut, dried (1)	1
Lush fish (1)	1
Crab, dungeness (1)	1
Crab, king (1)	1
Shrimp (1)	1
Caribou, liver (1)	1
Caribou fat (1)	1
Deer (1)	1
Deer, liver (1)	1
Porcupine (1)	1
Beach asparagus (1)	1
Laborador Tea (1)	1
Seaweed (1)	1
Beluga, skin and fat (1)	1
Seal intestines (1)	1
Walrus, blubber (1)	1
Walrus, flipper (1)	1
Duck (1)	1
Swan (1)	1

	Number of regions with Foods Eaten by >50% of Respondents (out of 5 Regions, Tables 4a-e)	Number of regions with foods listed as total amount consumed (Tables 6a-e)
Cloudberries/salmonberries (3)	3	2
Salmonberries, "Highbush" (1)	1	
Blackberries/crowberries (3)	3	3
Blueberries (5)	5	3
Cranberries (3)	3	
Raspberries (1)	1	
Red huckleberries (2)	2	
Seal oil (3)	3	2
Black fish (1)	1	1
Eulachon, cooked (1)	1	
Eulachon, dried (1)	1	1
Herring, flesh, dried		2
Ling cod, cooked (1)	1	
Northern Pike, dried (2)	2	2
Salmon, chum cooked (3)	3	1
Salmon, chum dried (3)	3	3
Salmon, king cooked (5)	5	3
Salmon, king dried (5)	5	4
Salmon, pink cooked (2)	2	1
Salmon, pink dried (2)	2	2
Salmon, silver cooked (5)	5	3
Salmon, silver dried (5)	5	5
Salmon, red, cooked (3)	3	3
Salmon, red, dried (3)	3	4
Tom cod, cooked (1)	1	1
Trout, unspecified (1)	1	
Whitefish, cooked (4)	4	2
Whitefish, dried (1)	1	3
Yellow-eyed Snapper (1)	1	
Sheefish (2)	2	
Halibut, cooked (2)	2	1
Halibut, dried (1)	1	
Lush fish (1)	1	
Clams (2)	2	
Crab, dungeness (1)	1	
Crab, king (1)	1	
Shrimp (1)	1	
Caribou, cooked (3)	3	3
Caribou, dried (2)	2	3
Caribou, bone marrow (2)	2	
Caribou, liver (1)	1	

	Number of regions with Foods Eaten by >50% of Respondents (out of 5 Regions, Tables 4a-e)	Number of regions with foods listed as total amount consumed (Tables 6a-e)
Caribou heart (2)	2	
Caribou fat (1)	1	1
Beaver (2)	2	
Deer (1)	1	1
Deer, liver (1)	1	
Moose, cooked (4)	4	4
Moose, heart (3)	3	
Moose, fat (2)	2	2
Moose, bone marrow (2)	2	1
Moose, liver (2)	2	
Porcupine (1)	1	
Beach asparagus (1)	1	
Laborador Tea (1)	1	
Seaweed (1)	1	
Beluga, skin and fat (1)	1	1
Bearded sea (oogruk) (2)	2	1
Seal intestines (1)	1	
Walrus, blubber (1)	1	
Walrus, flipper (1)	1	
Duck (1)	1	
Goose (4)	4	1
Goose, snow (2)	2	
Ptarmigan (3)	3	
Swan (1)	1	
Sea gull egg (2)	2	

APPENDIX F TOTAL CALORIE INTAKE DISTRIBUTIONS GENERATED FROM GOCADAN STUDY RESULTS

GOCODAN Study			
Age Group	**Males 17-39**	**Males 40-60**	**Males 60+**
50% Calories	3150	3088	2814
10% Calories	1022	16	1241
20% Calories		1070	
90% Calories	5278	6160	4387

APPENDIX G ESTIMATED CALORIE REQUIREMENTS FROM IOM, DRI AND CALORIE SCALE

Calorie Needs

Estimated calorie requirements from the Institute of Medicine, Dietary Reference Intakes

Gender	Age	Sedentary	Moderate Active	Active
Child	2-3	1000	1000-1400	1000-1400
Female	4-8	1200	1400-1600	1400-1800
Female	9-13	1600	1600-2000	1800-2200
Female	14-18	1800	2000	2400
Female	19-30	2000	2000-2200	2400
Female	31-50	1800	2000	2200
Female	51+	1600	1800	2000-2200
Male	4-8	1400	1400-1600	1600-2000
Male	9-13	1800	1800-2200	2000-2600
Male	14-18	2200	2400-2800	2800-3200
Male	19-30	2400	2600-2800	3000
Male	31-50	2200	2400-2600	2800-3000
Male	51+	2000	2200-2400	2400-2800

Calorie scale assuming “standard” at 19-30y

Based upon IOM Estimated Energy Requirements.

- Male 19-30y standard

Age	% of Adult Calories
2-3y	38%
4-8y	54%
9-13y	92%
14-18y	92%
19-30y	100%

- Female 19-30y standard

Age	% of Adult Calories
2-3y	50%
4-8y	70%
9-13y	80%
14-18y	100%
19-30y	100%

IOM DRI Chart

Gender	Age	Moderate Active	Percentage of Reference
Female	2-3	1000-1400	50%
Female	4-8	1400-1600	70%
Female	9-13	1600-2000	80%
Female	14-18	2000	100%
Female	19-30	2000-2200	Reference
Female	31-50	2000	
Female	51+	1800	
Male	2-3	1000-1400	38%
Male	4-8	1400-1600	54%
Male	9-13	1800-2200	69%
Male	14-18	2400-2800	92%
Male	19-30	2600-2800	Reference
Male	31-50	2400-2600	
Male	51+	2200-2400	

APPENDIX H FOOD CONSUMPTION PARAMETERS

Tables for Individual Foods Follow:

Summary Spreadsheets

Berries	Game Mammals
Bird Egg	Salmon
Fish Roe	Sea Mammals
Fish	Vegetation
Fowl	Water Animals

Food Worksheets

Berries	Fur Seal	Other Fowl	Sheefish
Bird Egg	Goose	OtherLand Mammals	Smelt
Bear	Grouse	Pike	Sole
Bearded Seals	Grey Whale	Polar Bear	Spotted Seal
Beluga	Grayling	Ptarmigan	Sucker
Black Fish	Halibut	Raw-Frozen Salmon	Swan
Bowhead	Harbor Seal	Ribbon Seal	Teas
Burbot	Herring	Ringed Seal	Tomcod
Caribou	Holligan	River Otter	Trout-dry
Cod	Irish Lord	Roe	Trout-other
Cooked Salmon	Lamprey	Rock Fish	Vegetation
Crane	Lingcod	SalmonHead-Eyes-Cheeks	Walrus
Deer	Misc Seal Parts	Salmon Liver	Water animals
Dry Salmon	Moose	Salmon Roe	White fish
Duck	Needlefish	Sea Lion	